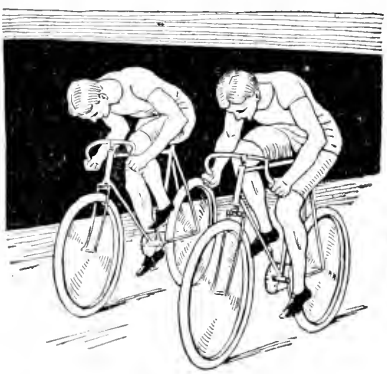
Vol. VII., No. 76A.
Issued Monthly.

JANUARY, 1898.

Price, 10 Cents.
$1.20 Per Year.

Spalding's Athletic Library

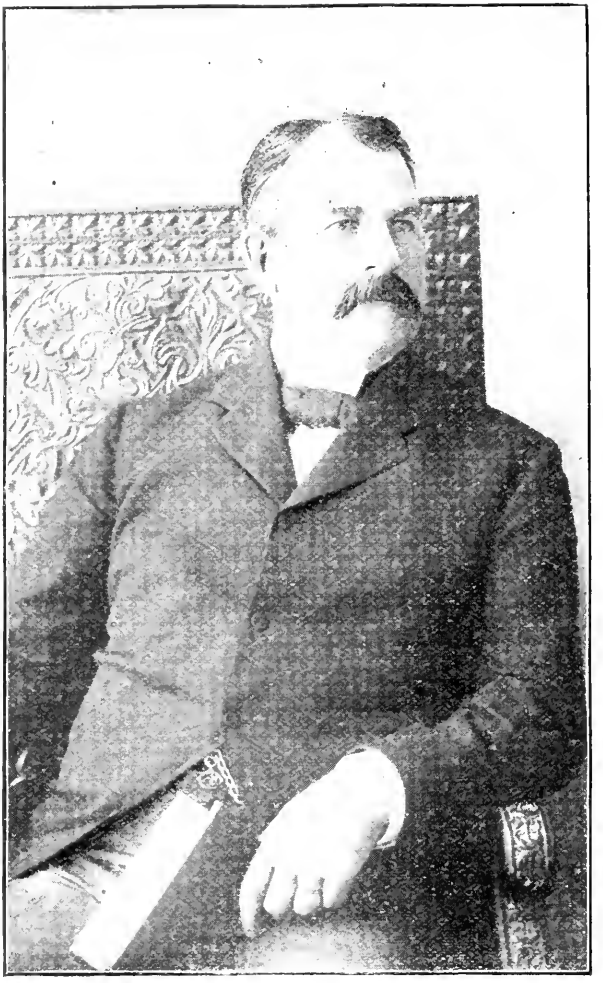


Spalding's Official Bicycle Guide

For 1898

Hints on Training, Portraits of the Leading Riders, Information for Cyclists, Complete Records, Etc.

PUBLISHED BY THE
AMERICAN SPORTS PUBLISHING CO.
241 BROADWAY, NEW YORK
Entered at the New York Post Office, N. Y., as Second Class Matter.



A. G. SPALDING.

SPALDING'S

OFFICIAL

BICYCLE GUIDE

FOR 1898

CONTAINING PORTRAITS OF ALL THE LEADING AMERICAN RIDERS AND VALUABLE INSTRUCTIONS TO CYCLISTS

HINTS ON TRAINING

COMPLETE LIST OF "BEST ON RECORD"

EDITED BY S. A. NELSON

PUBLISHED BY THE
AMERICAN SPORTS PUBLISHING COMPANY
241 BROADWAY, NEW YORK

CONTENTS

THE YEAR 1897 IN CYCLING.

A careful review of American cycle racing for the past season warrants the statement that it occupies as prominent a place in the estimation of an ever-vacillating public as any sport recorded on the calendar. This is doubtless due to the fact that in no other sport is the spectator a practitioner of that which he views.

It would be a base libel to say that cycle racing is a "fad," when the amount of money invested in it by practical men is considered and note taken of the number of professional and amateur racing men who are making a living out of the sport; for peculiar as it seems, it is hard to distinguish the amateur from the professional either by his work on the track, the peculiar construction of his anatomy, or even his relations with the festive "maker," made to suffer so often through his ambition to help along some poor, struggling amateur to fame via the "coin of the realm" route.

It is estimated that there are in the United States 1,000 professional racers and ten professional winners. In the amateur class they are so numerous that if an attempt were made to count them the numerals would give out. They all manage to exist in some mysterious manner, however, and so long as they keep alive they will remain in the class of racing.

These men, together with the improved condition of tracks, and the additional fact that racing as an art has been practiced more regularly this year than ever before, have combined to make the season just closed the most successful that has ever been known. The season of 1897 will be long remembered as the greatest racing season ever known in the memory of the "oldest critic." The star feature was the middle-distance match racing made popular in this country by the arrival of Jimmy Michael, a diminutive midget, who has revolutionized our races and set the racing and scientific world a-guessing. He is the most marvelous athlete the world has ever seen, for with his diminutive size he combines a power and an ability that is gigantic, and during the last season has duplicated in this country his record in England, France and Germany. He has been the bright particular star of the match racing season.

ALBERT MOTT,
Chairman L. A. W. Racing Board.

He has met defeat only once during the entire season, and he met all who were brave enough to face him in a race.

Nothing of a sporting nature can begin to compare with a middle distance paced bicycle race for excitement and interest. During the season just closed such races have been run with Jimmy Michael, who is the star of the season; Frank Starbuck, a doughty Quaker rider of exceptional prominence; Eddie McDuffee, a record breaker and match rider of considerable fame; Lucien Lesna, a French middle-distance champion; Fred Titus, Floyd McFarland and several other less important personages as chief competitors. Michael has won every race in which he entered save one, the record for the season standing as follows:

	Michael.	Starbuck.	Lesna.	McDuffee.	McCarthy.	McFarland.	Titus.	Won.	Per cent.
Michael	—	1	3	2	1	1	1	9	.900
Starbuck	1	—	0	0	0	0	1	2	.500
Lesna	0	1	—	1	0	0	0	2	.400
McDuffee	0	0	0	—	0	0	0	0	.000
McCarthy	0	0	0	0	—	0	0	0	.000
McFarland	0	0	0	0	0	—	0	0	.000
Titus	0	0	0	0	0	0	—	0	.000
Lost	1	2	3	3	1	1	2		

It must not be thought for a moment that all the interest centred in these match races, however, as there were hosts of short distance riders who, becoming inoculated with the germ of match racing, met many times during the past season. As in the competitive races, Eddie Bald, the Buffalo wonder, was the star. Earl Kiser, Fred Loughead, Tom Cooper, Arthur Gardiner and other less famous riders comprised the lot of match riders in this line. They, too, have a record table, and at the close of the season the men were rated as follows:

	Bald.	Kiser.	Eaton.	Cooper.	Loughead.	Gardiner.	Walthour.	Won.	Per cent.
Bald	—	3	1	6	3	2	1	16	.696
Kiser	1	—	0	3	1	0	0	8	.571
Eaton	1	0	—	0	0	0	0	1	.500
Cooper	2	3	0		1	0	0	6	.375
Loughead	0	0	0	1		0	0	1	.167
Gardiner	0	0	0	0	0	—	0	0	.000
Walthour	0	0	0	0	0	0		0	.000
Lost	5	6	1	10	5	2	1		

THE SPALDING TEAM.

EARL KISER, Half Mile L. A. W. Champion. A. C. MERTENS, Five Mile L. A. W. Champion.

The national championship races this year were held in Philadelphia, although several of them were postponed to other cities. The wonder of the professional class was Fred Loughead, a Canadian by birth, who has been riding in this country for the past three years. The first day at Philadelphia he surprised the entire cycling world by winning two championships, a feat that was not duplicated during the meeting. Among the other championship winners in this class were Kiser, Bald, Mertens and Hoyt. The League of American Wheelmen, the governing body of racing in this country, has heretofore permitted the amateurs and the professionals to compete together in the championship events, but this year this was changed and an entirely separate class of champions was made. They were called "amateur champions," and in the exclusiveness of their own class they ran and romped to their hearts' content. The 1897 national champions are as follows:

		Time.
	QUARTER MILE.	
(a)	E. C. Hauseman, New Haven.....	.34 2-5
(p)	F. J. Loughead, New York.....	.32
	THIRD MILE.	
(a)	E. W. Peabody, Chicago.....	.42 1-5
(p)	E. C. Bald, Buffalo	.45
	ONE-HALF MILE.	
(a)	E. M. Blake, Keene, N. H.....	1.03 4-5
(p)	Earl Kiser, Dayton.....	1.03
	ONE MILE.	
(a)	C. M. Ertz, New York.....	2.16 2-5
(p)	F. J. Loughead, New York.....	2.03 3-5
	TWO MILES.	
(a)	I. A. Powell, New York.....	4.29 1-5
(p)	F. C. Hoyt, Bridgeport.....	4.15
(t)	Bald-Church	4.46
	FIVE MILES.	
(a)	E. C. Hauseman, New Haven.....	10.33 3-5
(p)	A. C. Mertens, Minneapolis.....	10.54

(a) Amateur.
(p) Professional.

America, unfortunately, had no representative at the world's championships, which were held at Glasgow, Scotland. That is the only excuse offered for not having the world's championship medals in this country at the present time. The amateur events were won as follows: One mile, by Schroeder, of Denmark; 100 kilometres, J. Gould, of England.

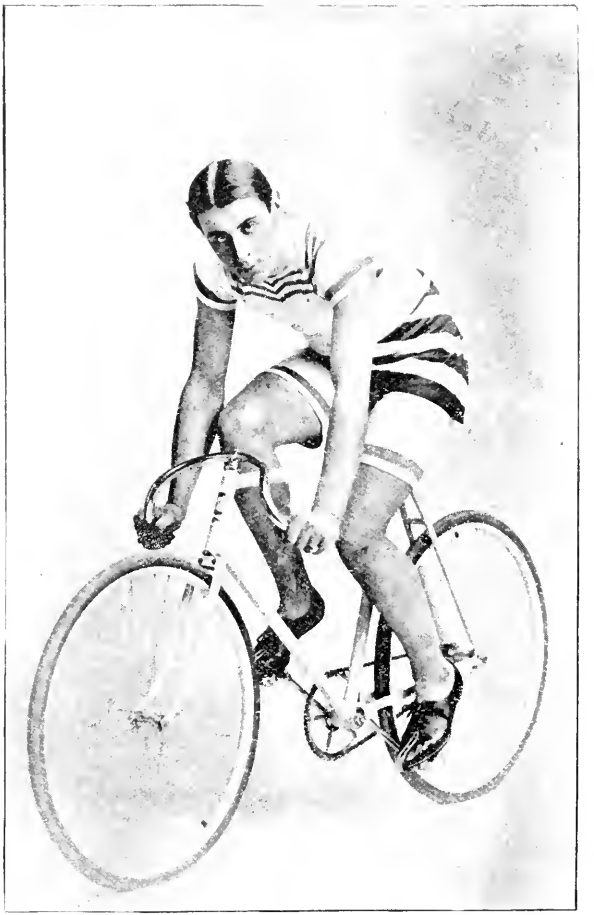
JIMMY MICHAEL,
The Sensation of the Year.

The professional class was separate and distinct, and was composed of a similar programme, the professional mile being won by a youngster from Germany, Willi Arend, and the 100 kilometre event by J. W. Stocks, the famous world's record holder of England, who at present holds the world's record for one mile at 1.35 2-5, beating the best running horse record and the hour record at 32 miles 1,065 yards. The special match between the amateur and professional mile champions was naturally won by the professional. Next year this meeting will be held at Vienna, and already preparations are being made to send a large and representative American team abroad to battle for the world's championship honors.

One of the most interesting details of the American racing season is the "National Circuit," which is a product of this country only. This circuit generally forms in the spring and continues until late in the fall, traversing the most populous portion of the United States, on which tracks the acknowledged short distance champions of the world struggle for victory and what it represents. This year the circuit has suffered considerably by the thousand and one meetings, given independently of the circuit, with prizes of such intrinsic value as to tempt the fast rider from the beaten paths of the circuit. However, even with these disadvantages, the racing men who followed the circuit visited over thirty cities, racing more than fifty days in over 200 races which had been prepared. In all of these races, as an example of the speed shown by the American riders, the average time made in quarter-mile races was 32 seconds, in the third mile 44 seconds, in the half mile 1.03, in the mile 2.12, etc. The first ten men to finish at the top at the close of the national circuit is reckoned as follows :

Name.	Firsts.	Seconds	Thirds.	Points.
E. C. Bald	20	11	5	106
Arthur Gardiner	8	10	7	59
Tom Cooper	8	3	6	41
Nat Butler	7	6	1	41
A. C. Mertens	5	5	7	37
O. L. Stevens	6	4	3	35
Earl Kiser	3	5	6	28
C. R. Newton	4	4	3	27
F. C. Hoyt	4	1	5	23
O. S. Kimble	4	2	3	23
F. A. McFarland	3	4	3	23

It would be hard indeed to estimate the amount of money won in prizes and salary by the average racing man, but among those whose names are given above it is fair to estimate that their winnings averaged $100 for each first, $75 for each second and $50 for each third, to which must be added their



EDDIE CANNON BALD.

salary, as nearly all of the professional riders are employed by makers of bicycles and accessories.

There have been many new tracks built the last year, which is a good omen for future racing.

Racing is now divided into sections—there are the competition riders, who ride in the open, scratch and handicap events; the short distance match-race riders, who ride match races for ten miles and under; and the middle distance riders, such as Michael and Starbuck, who through the assistance of a small army of pacemakers ride twenty-five to thirty-five miles, and it has been the case during the past season that in nearly every race over this distance the records have fallen. While the world's record for the mile and the hour, two of the most coveted records on the slates, are not held in this country, there is a satisfaction in knowing that the mile record has been equalled by an American rider and that the hour record has been dangerously approached.

The men of the year, therefore, are Jimmy Michael in middle distance match racing, Eddie Bald for the shorter distances and Earl Peabody, a Chicago amateur, in his particular class. This youngster has closed the season with 110 first prizes to his credit, a greater number than has ever been known for one man since the days of the peerless Zimmerman, who tied the record with a credit of 103 firsts. In record breaking Eddie McDuffee fairly shares the honors with Jimmy Michael, as both have done most excellent work.—*Town Topics*.

IRWIN A. POWELL,
Two Mile Amateur Champion.

LONG DISTANCE RIDING AND METHODS

By F. J. TITUS.

Among the twelve foremost riders in America there are but two capable of taking part in sprint and distance racing at the same race meet and they are liable to obtain first, second or third honors. These men are Harry Maddox, of Asbury Park, and Nat Butler, of Boston. In order to be capable of equaling the present records for long distance work it is absolutely necessary to train for such work conscientiously under the supervision of a competent trainer, one who has common sense and is careful not to permit his charge to overwork while in training and one who, when the time comes for the trial, is directive and has under his thumb a manageable set of pace-makers capable of going at any pace required steadily and with judgment, men who have trained just as well in their pace and pick-ups as the aspiring record-breaker. In France and England, where the long-distance race is the proper thing, the men confine themselves to this style of racing—that is, they do not take part in the short-distance racing, but only ride at their favorite distances, which may be five, ten, twenty-five or one hundred miles.

The success of the "Little Wonder," Michael, in France is due to the fact that he made a specialty of distance work, while his competitors kept changing from sprint racing to trials of endurance. He was trained to stand the punishment and knew when to rest and when to go. A man may be ever so good, well trained, etc., but he can never equal or come near the record if the pace is not the best. One may ask what I mean by the best.

At the present day machines with two men up (tandems) are not capable of equaling the one-hour professional world's record of a little over twenty-nine miles, not even if you have all the tandems in the country. What is needed in the way of machines for pacing are triplets, "quads," quintettes, sextettes —say one sextette, three "quads," three triplets are about right to give a rider the world's one-hour record and capable of doing over thirty miles an hour.

To those who do not know the meaning of the above terms, I will tell them. The tandem, as we all know, is a wheel for

H. K. BIRD,
One Mile Metropolitan A. A. U. Champion.

two; the triplet, for three men; the quadruplet, a bicycle for four men; the quintette, a bicycle for five men, and a sextette and a multi-cycle for six men. You may have heard of the Californian nonpulet, a cut of which appeared in a daily paper on November 3, 1895. This was only a myth, not a reality, a vision of some imaginative Californian, and was supposed to carry nine men at the rate of a mile in twenty-two seconds, which, as is shown by the following figures, to be impossible, by applying the natural laws of air resistance and the power of man.

The fastest time ever made by a quadruplet is 1:35; the best possible unpaced mile by a nonpulet would be 1:22, according to actual progression and percentage gained by each man. The laws of air resistance are well known. Take two riders moving along, say twelve feet apart, the second man receives twenty-five per cent. less air resistance than the first man, hence the benefit of pace. At a mile in 1:35 more than sixty-five per cent. of his weight goes for air resistance. The resistance of the wheel on the road is plainly proportional to the speed and a small factor. The chain resistance is a great factor. The average work of a healthy man is fifty-five foot-pounds a second, that is, to raise one pound one foot in one second. For a short time the same man can do 100 foot-pounds and under excitement 140. When W. C. Sanger rides a mile in two minutes the air resistance is 80 foot-pounds. His chain resistance 40 pounds, machine resistance 10 foot-pounds; total, 130. At a 1:35 gait his resistance to the air increases to 135 foot-pounds; chain, 50 foot-pounds; machine, 15 pounds; total, 200 pounds. Thus, one can see that it is impossible for an ordinary athlete to ride an unpaced mile in 1:35. The air resistance alone is more than the average athlete can perform for 95 seconds, but let him be paced, his air resistance is reduced from eight per cent. to fifteen per cent., according to the closeness with which he follows the pacemaker and we only have 110 foot-pounds air resistance, which gives a total of 175 foot-pounds nearer the possible performance of an athlete.

To go a mile in 22 seconds on the nonpulet would require each rider to exert nine horse power, of which eight horse power would be air resistance. The Empire State Express, going a mile in 33 seconds, exerting 200 horse power, had to spend 60 horse power for the air resistance; at a mile in 20 seconds the engine could not develop steam enough for the train to overcome the resistance of the air, without any other resistance being accrued.

It is no small thing for an athlete ordinarily capable under

W. H. FEARING,
Quarter Mile Intercollegiate Champion.

exertion to perform one-fourth horse power, to perform nine horse power for 22 seconds, as is asked of him on the nonpulet, is the wildest kind of an absurdity. The strongest athlete can perform but one-half horse power for 10 seconds at the maximum."

From above we can understand why it is necessary to have good pacing by large and fast machines. This is known and applied by our European cousins, as is shown by their record table, which in trials of endurance surpasses the figures on the slate of all others. It cannot be that their men can surpass the ability of all others if they did not have the benefit of almost perfect pacing. In order to prepare for and overcome the severe punishment attached to a ride lasting one hour, at an average pace per mile of 2:05, it is best to ride two months in all kinds of races and on all kinds of tracks, gradually increasing the distance of the races. Set much of your own pace. This gives endurance. Try an unpaced mile once a week, doing your best at each trial. This will enable you to observe your improvement. Finally, about two weeks before your trial, have pacemakers at the track you are training on begin training in conjunction with your own. Stop taking part in all races at any distance and confine yourself to the ride in view. Ride ten miles in the morning, first two or three unpaced, then have the pacing machines drop in and pick you up. Cover the seven or eight remaining miles at a 2:08 or 2:09 pace. Have the pacemakers practice making the pick-ups. In the afternoon cover some twenty miles at a time, paced most of the way at the rate of 2:07–2:15, finishing with a quarter mile sprint, endeavoring at the time to best the pacing machine at the tape. Always have a thorough rub after each ride, use cold water sponge occasionally above waist to harden the muscles. The legs must be soft and pliable. See that the legs do not cramp, and if they do tell the trainer where and let him rub plenty of goose-grease on that part at night after taking a hot bath, rubbing plenty of liniment on in the morning, wiping clean with a rough towel. Have him pay special attention to the parts that are cramped.

No one knows what a severe test it is to body and mind to ride for one hour without having first tried it. When I say ride for one hour I mean at record speed. If one feels a little nervous before the trial it will aid him to endure much, as he will ride on his nerve and probably succeed in his attempt, with good pacing. The one great difficulty in this country and the only reason we cannot equal the foreign long distance records, is because we have not paid enough attention to pacing facili-

J. T. WILLIAMS, Jr.,
Quarter Mile Intercollegiate Record.

ties. The success of a trial depends upon the quality of the pacemaking. The pace must be, in order that a man lasts for one hour, very steady. I mean by this that if twenty-nine miles are to be done in the hour each mile must be at an even gait, about 2.05. If a man cannot do twenty-nine miles in the hour his schedule must be slower in order that he should finish.

In my last one hour's record ride, at Springfield, Mass., the pacing was very inferior, ranging from 2:01 at the sixth mile to 2:22 at the eighth mile. Such a jerky pace is sure to weaken the rider and may prevent him from accomplishing his object.

No stimulants are needed while riding. The excitement acts as a strong stimulant. All the attention of the trainer should be given to the making of good connections by the pacemakers. He should have signals known by the pacemakers that they may be slowed up when the pace is getting too fast, or more faster when too slow—in other words he must see to it that the pace is absolutely even and that the man has nothing to worry about.

After the ride is over a little stimulant can then be taken if needed. The man should be immediately covered by blankets, each part dried perfectly, keeping the cold air well away from the chest and other parts. Get the man dressed as quickly as possible, away from the track and curious eyes, to quiet, and thus give his nerves a chance to settle, not permitting him to eat his dinner for at least an hour and a half, getting him to bed earlier than usual.

I trust that the few suggestions above mentioned may be of some service to young riders of ability, as coming from one who has had actual experience in cycle racing at long distances for the last two years.

It is an established fact that there is no particular rule or stipulated routine that could be universally recommended for the guidance of a cyclist in training. The prime reason of this is that no two men are built exactly on the same lines, and the treatment suitable to one may entirely upset the constitution of another, so it is a case of suiting the physic to the patient's taste. However, there are a number of facts known to modern trainers which every man must stick to in order to be successful on the track.

In the spring—the period a cyclist starts to train—it is absolutely necessary to take a good physic. By this we mean six or seven prescriptions of any reliable purgative recommended by a doctor. This process will rid the stomach of any superfluous bile and consequently the blood will be cleansed and purified. Good blood makes good muscle and strong bone.

MILTON BROWN,
Of Passaic, N. J. A Crack Amateur Rider.

The cyclist should be especially careful not to overwork himself when beginning the season. It is this overworking that ruins so many ambitious young riders. They are stale and weakened before they know what is the cause and it takes months to undo what could be easily bridged over by a little caution or judicious management.

The tyro should commence with easy, light exercise and keep gradually increasing the length of the daily ride. The first week three or four miles will be sufficient at, say a 3:30 gait, morning and afternoon. With the increasing power the pace should be quickened until the mile can be covered in 2:50. Finally, find your "sprint," "let out" at the end of the journey for 100 or 200 yards. Follow this plan for a couple of weeks, after which the rider will be in a condition to do harder work.

It is a good plan to work two hours after eating.

It is prudent to work into your sprint slowly, as a rider is less liable to strains.

The great secret, in my mind, to be a good rider, is to have plenty of rubbing with liniments, because with a correct massage treatment, stiffness and soreness will leave as if by magic.

I have frequently seen a rider come in after a hard race, his energy gone and groaning with cramps. I have seen his trainer take hold of him and perhaps in ten minutes trot him out again without being half rubbed, with the always repeated injunction to win or die.

The position a rider takes on his machine is another vital point. A great many ride too low a reach, or else too long, or too far forward or too far backward. There is a happy medium. Turn the cranks of the machine so that they are parallel with the top of your saddle. Then take a plumb-line and move your saddle forward so that the peak is just about 2½ to 3 inches forward of the pedal.

So much has been said and written about the staple articles of diet suitable for an athlete or bicyclist in training that any advice here would be entirely out of place.

The human body is such a true machine, that a trainer who does not study his subject will eventually, prove a failure. A great many of these self-styled oracles who call themselves trainers, pay no attention whatever to the upper portion of the human frame, and this is a great mistake, for here is centered the human machinery.

W. C. Sanger also gives some valuable information about preparing for a season's campaign on the path.

"Before doing any work at all, the stomach must be got into shape by a thorough physicking, which relieves the system

EARL W. PEABODY,
Winner of 110 Firsts in 1897.

of all bilious and troublesome matter. This leaves the body in a very weak condition, and it must be strengthened gradually by keeping very quiet and eating light food, such as milk toast, soft boiled eggs, etc., for a few days, after which time more strengthening food may be taken.

"The first three days very little exercise is sufficient; for instance, three to six miles a day, at about a 3:20 to 3:30 gait. This is gradually worked down day by day, until at the end of a few weeks the pace is brought down to about 2:50. The third week will show a more rapid change in the condition of the man, the miles will be rolled off at about a 2:30 to 2:35 clip, and the distance by this time will be lengthened to about nine miles each day. A little faster work may now be indulged in, and about one-half mile can be reeled off at about a one minute clip (paced), to show the condition of the man in regard to endurance. If he is found wanting, he must again return to plugging, while, on the other hand, if he has the required amount of endurance, he may start to sprint a short distance.

"During all this time great care should be taken not to reduce too rapidly, as this will cause the skin to become feverish, but the superfluous flesh should be turned into solid muscle rather than removed altogether. In short, no attempt should be made to reduce the man's weight below a medium point, so that at the beginning of the racing season he will have a little flesh to work on, as he will gradually be worked down during the hard season's campaigning.

"It is at this point that the trainer should get in his fine work, turning the superfluous flesh into muscle. After each work-out the man should have a thorough drying with coarse towels, followed by a most thorough massage, every muscle being worked and manipulated. The flesh on the stomach, back and loins is rolled in the fingers until the whole body seems to be covered with but a slight layer of flesh sheeting over the muscles. Care should be taken too keep the muscles of the legs soft and pliable, as there is no speed in a muscle that becomes hard.

"After the body and muscles have been put in fine condition, the sprints are gradually lengthened, until the rider is able to cut a full quarter of a mile at top speed and finish strongly. Being able to do this, he is in condition to begin the season's campaign, which opens the latter part of May, and lasts until the end of October, when the record season begins.

"A trainer cannot spend too much time with his man, especially after races. Every moment in this work will doubly repay rider and trainer, as the more the muscles are worked the more flexible they become and the less liable to stiffen up

TOM COOPER.

or bind after a sprint. The racing man cannot give himself too fully into the hands of his trainer or rely too much on the latter's judgment, provided the trainer is a competent man, as the trainer is working for himself as well as the rider, and the record of the latter's victories and defeats is the record of the trainer's work. The man in training should avoid eating pastries and all kinds of rich food. A little fruit eaten in the morning does more good than harm, and the less coffee or water taken the better.

"This course of training will not apply to all men, as the constitutions of all men are not the same, but this is the course which I follow very closely."

TRAINING.

TRAINING is an exhaustive subject, but the principles of training are simple. The object of training is two-fold—1. To produce perfect general health; 2. To develop special powers in individual organs. To the last named branch belongs the training of the racing man, but the first is of interest to all riders. Briefly summarized, the rules for a healthy life, as propounded by a distinguished physician, are:

1. The hour of rising should be moderately early—say 7 in Summer and a little later in Winter.

2. A cold bath should be taken (all the year round, unless delicacy of health prevents it), preceded in Summer and followed by a quarter of an hour's exercise with dumb bells or Indian clubs. After the bath, rub down briskly with a rough towel.

If a swimming bath is available, a ten or fifteen minutes' swim will supply both bath and exercise. If there is a walk to the bath, a crust of bread and a cup of milk, or a bowl of oatmeal porridge should be taken before leaving the house.

Breakfast about 8 o'clock to consist of a chop or steak, ham or bacon, and bread and butter, *thoroughly masticated*. A soft boiled egg may be taken occasionally. Potted meats and spiced dishes should be avoided. Coffee is preferable to tea.

Walk to business, if possible, and when doing so it is not advisable to hurry, for too active exercise immediately after eating is injurious.

Dinner—to be taken about 1 o'clock—a plain substantial meal of fish or meat, with vegetables and a moderate allowance of plain pudding or fruit tart. Veal, pork and all shell fish (except oysters) are to be avoided as indigestible. Among

RAY DAWSON,

One and Five Mile Intercollegiate Champion and Record Holder.

vegetables, potatoes, the flowery part of fresh cut cauliflowers and young carrots or asparagus, when in season, are recommended. Turnips, and also cabbage, unless very young and freshly cut, are to be avoided. Water should, for young men, be the only beverage.

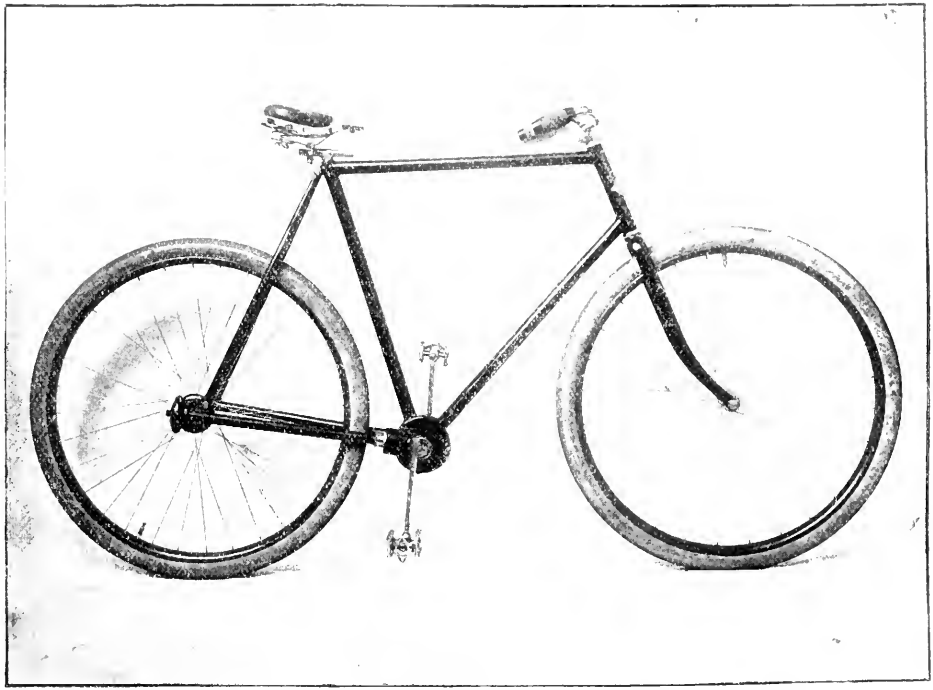
Walk home from business when you can. Tea, with bread and butter, and fish, if desired, to be taken about six o'clock. After tea a couple of hours of active exercise in rowing, running, cycling, gymnastics or drilling, according to the taste of the individual. Supper of cold meat and bread, and to bed soon after 10. On Saturday afternoons and holidays, additional active exercise as opportunity may permit.

The quantities of food recommended for daily consumption are as follows:

	Oz.
SOLIDS:	
Meat, cooked and free from bone =13 to 15 oz. of the uncooked joint.	10 to 12
Bread	16
Potatoes, 10 oz., or cauliflowers	12
Pudding or pastry	6
FLUIDS:	
Coffee and milk at breakfast, about	18
Water (at dinner and supper)	22
Tea	10

And as little as possible drinking between meals, unless after strong exercise. Tobacco and alcohol are to be strictly avoided, both being poisons to young men, especially those in frail health. In later life, they may, in strict moderation, be used with advantage.

A young man strictly following the above rules will, after a little perseverance, find himself in thorough general health, and in a condition to enter upon the severer course of training by which alone men can hope to fit themselves to achieve eminence in any branch of athletics. With this further preparation we have nothing to do; neither have we space to quote the scientific arguments for the rules above laid down. We may, however, mention, for the information of non-athletic readers, that the formulator of the above rules was not a mere medico, putting forth theories on a matter of which he had no practical knowledge, but was also one of the most distinguished English bicyclists of his day, having held no less than four championships (one, five, twenty-five and fifty miles) in a single year—1879—and three of them in the succeeding year. He speaks, therefore, with both scientific and practical authority, and every line which he has written on this subject is of vital interest to all who value that greatest of blessings—a sound mind in a sound body.



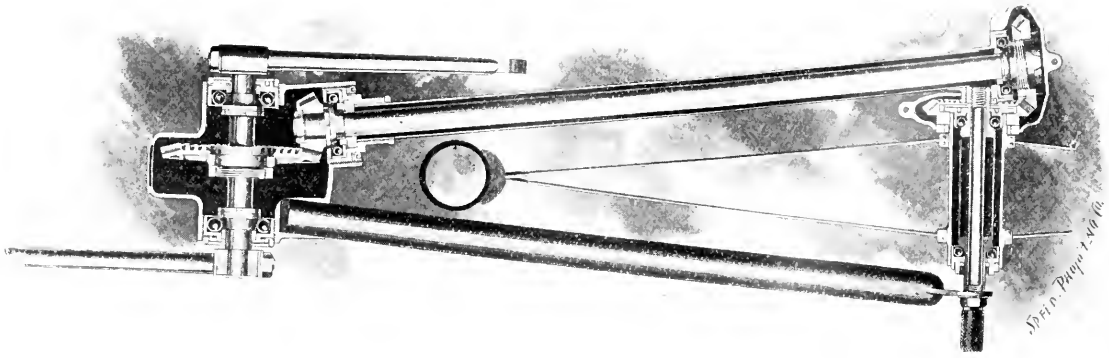
THE CHAINLESS WHEEL.

In keeping with the development of the wheel and the march of improvements, the chainless was more fully exploited in 1897 than ever before. The Columbia folks were the first to appear on the scene with the public announcement that their leading model for '98 would be a chainless. In this style of wheel the old League chainless was really the pioneer, although a year ago the Spaldings exhibited at the cycle show a perfect wheel of this type. The chainless has come to stay and a detailed description of a standard model is as follows:

In the Spalding chainless the transmission of power from the crank shaft to the rear wheel is obtained by bevel gears, instead of the usual form of sprockets and chain now in generally accepted use. The mechanism consists of a series of four bevel gears used in conjunction with a tubular gear shaft, is simple in construction and can be readily taken apart and reassembled whenever necessity requires.

The main driving gear, the largest gear of the series, is fastened to the centre of the crank axle, the power being transmitted from this by a smaller intermediate gear to the tubular gear shaft running through the lower right rear fork tube, and this in turn transmits the power to the rear intermediate gear, which directly engages the gear secured to the rear wheel in place of the usual sprocket.

The location of the main driving gear in the *centre* of the crank axle brings its position also in the centre of the crank hanger barrel, adds greatly to the appearance and symmetry of the machine, insures greater strength, and divides the strain more equally on the bearings. The intermediate gears are securely locked to each end of the tubular gear shaft by a simple locking device, more particularly described elsewhere, which makes it possible to remove and replace the gears conveniently, and without the necessity of any special tools and appliances. The tubular gear shaft rotates on ball bearings specially constructed and designed to receive the thrust of the driving gear, and transmits the power to the rear hub. The lines of the rear portion of the frame present the same appearance as in bicycles



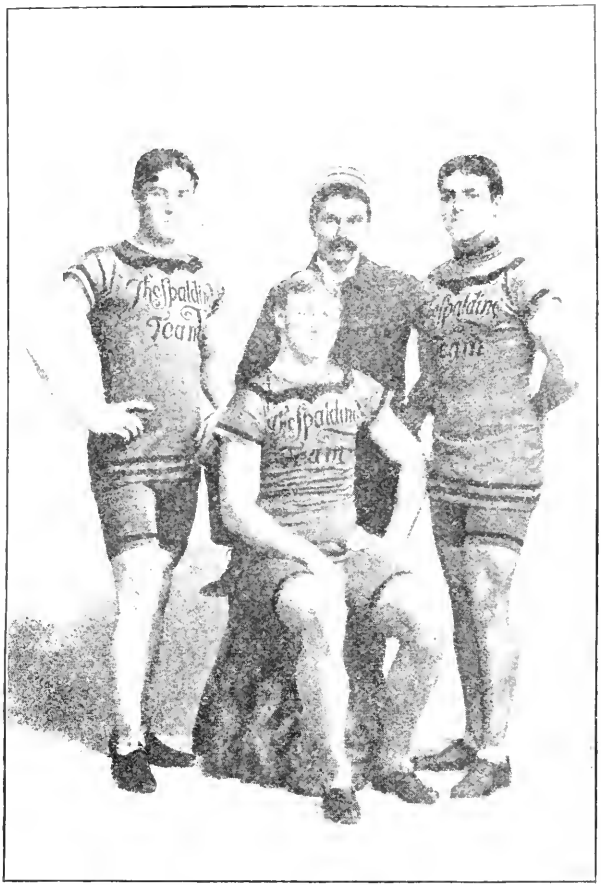
MECHANISM OF THE CHAINLESS BICYCLE.

of the ordinary chain type, the only perceptible difference being in the small aluminum cases which covers the gears. In this particular the Spalding Chainless differs from all others, presenting nothing unsightly to detract from the appearance of the machine.

The method of fastening the main driving gear to the crank shaft, and the front and rear intermediate gears to the tubular driving shaft is original with us. The customary method of attaching these gears is to screw them on, but this method we have demonstrated from experience is impracticable, for the reason that the constant strain on these gears in hill climbing or heavy work kept screwing the gears tighter and tighter on their shafts; the result being that after a brief period of riding they became so firmly fastened that it was impossible to remove them should necessity require, without great difficulty and the use of special tools and appliances. In the Spalding Chainless these gears are constructed with a tongue projecting from the back side of the gear. The gears fit snugly to their respective shafts and this tongue is received in a recessed collar which is solid with the shaft and prevents any rotation of the gear on its axis. The gears are then securely locked in place by an ordinary lock nut, which when set up makes a positive fastening which cannot work loose under any conditions, and one that can always be readily removed and adjusted.

The gears used on the Spalding Chainless are cut by special machinery, and are theoretically correct, and are as absolutely perfect as it is possible to make bevel gears. Each gear represents the frustum of a cone on the periphery of which the gear teeth are cut, and are so shaped that as the tooth of one gear approaches the tooth of another gear, the action is that of a fine rolling motion throughout the entire angle of contact, operating noiselessly, without slipping, grinding or friction. The gears after being cut are carefully hardened in such a manner as prevents their being warped, twisted or thrown out of line in the process, as the slightest variation of this nature would render them unsatisfactory in operation, if not entirely useless. After being hardened they are carefully ground on special machinery to insure the contact surfaces being perfectly smooth, and to secure absolute perfection in the meshing of the teeth.

That the Chainless Bicycle has come to stay is an assured fact to those who have had opportunity to study its mechanism, and test its ease of operation. Its advent represents a revolution in mechanics, particularly cycle mechanics; the results obtained with it from practical experience completely upsetting the theoretical calculations of those who so readily criticise or condemn any new idea or device on general principles, and



A TEAM OF WELL-KNOWN CYCLISTS.

Fred Titus. Walter Sanger. L. D. Cabanne.

Dave Shafer, Trainer.

often without resource to that practical knowledge and experience which is so important in every mechanical enterprise, particularly in bicycle construction: but, practical, common sense bicycle construction has upset many theories before the advent of this new application of an old principle, and as practice demonstrates more thoroughly than theory what is good and what is bad in cycle construction, we would forcibly remind you that the Spalding Chainless Bicycle is no experiment, but is the perfected result of mechanical skill coupled with experience, which experience has demonstrated the fact that under all conditions of weather and roads, the chainless bicycle, with the power transmitted by beveled gears, is more satisfactory and practical than any other accepted type of driving mechanism. In its construction the very best thought, the very best work, and every resource of the very best establishments of this country, have been centered, and the present perfected machine has more than realized the expectations of those interested in its development.

It is now nearly two years since this establishment first undertook the matter of building chainless bicycles, and over a year since our first complete machine was put into actual use on the road. This same machine is in use to-day, and if anything is better, after having been ridden over 25,000 miles, than it was originally. Its working parts show no perceptible wear, the frictional parts in the gears being polished more smoothly through use, and running better to-day than when the machine was first put on the road.

In the chain driven bicycle, it is an accepted fact that the chain is directly responsible for much of the grief with which the rider comes in contact. It must be kept thoroughly lubricated, free from dirt, sand and water, and requires constant care, no matter how accurately or carefully constructed. In the Chainless Bicycle all these obstacles are removed, the gears and driving mechanism being enclosed in dust-proof cases requiring practically no attention. The wear on the gears is imperceptible, and in ordinary use it will not be necessary to adjust or lubricate this portion of its mechanism during an entire season's riding.

What will astonish the novice is the ease with which the machine drives. Lift the wheel clear from the ground, spin the wheel, and you will wonder at the ease and smoothness of its motion. There is no swaying, no jump, no noise, and the wheel runs and runs until you wonder at its persistency. The same conditions obtain when the wheel is put into service. On the level or in coasting, its superiority is manifestly apparent, and the average rider will marvel at the quick response to

JOHN S. JOHNSON.

power applied to the pedals, and the ease and rapidity with which the machine gets under way. There is no lost motion, no grinding, creaking or jumping, as in the chain wheel, but an absolute obedience to the will of the rider, a response to his efforts that cannot be realized until the machine is ridden. In hill climbing the result is the same, the machine responding immediately to every ounce of power applied. The gears being enclosed and perfectly lubricated, water, mud or dust have no effect upon its driving mechanism, and there is no falling off in efficiency, no matter how long may be the run, while in the chain wheel friction steadily increases as the machine is ridden further towards its destination.

A concerted effort is being made, on the part of some manufacturers, to try and belittle and if possible create a prejudice against the chainless machine. Elaborate tests and bewildering tables and diagrams, based upon so-called theoretical grounds, have been, from time to time, presented to demonstrate, if possible, to the public mind, the "reason why" the chainless should not meet with public favor. But facts are facts, and we can but reiterate that a year's practical use on the road, under any and all the varying conditions incidental to summer and winter, snow, ice, rain, mud, dust, heat and cold, has only demonstrated more strongly and forcibly that in spite of all this so-called scientific criticism, the one bright particular fact which remains and which cannot be dissipated and which all this outcry but emphasizes more and more, is that the Chainless, driven with beveled gears, when properly built, represents the simplest, safest, cleanest, and most durable form of transmitting power that has yet been applied to any bicycle, and that for every-day, come-as-it-may, take-it-as-you-find-it riding, the maximum of speed for the minimum of effort will be found in the Chainless Bicycle.

ENAMELING.

The enamel of a machine frequently gets chipped or worn off in places, giving it a shabby look, although it may be generally in good condition. The original enameling of a high-class machine is a form of japan, and demands heat for its perfect application. There are, however, several preparations which answer very well for touching-up purposes, and every cyclist should be provided with a bottle.

J. F. STARBUCK.

LEARNING TO RIDE.

There is an idea prevalent among non-riders that riding a bicycle, as some persons believe of driving a gig, comes by nature and requires no apprenticeship. Nothing can be a greater mistake. It is quite possible for a man to mount a bicycle without previous instruction, and (with luck) to muddle along somehow until he has taught himself, after a fashion, how to manage it, but it is more likely that such an experimentalist will find himself "picking up the pieces" of himself and machine at the foot of the first sharp descent he comes to.

There are three things which demand the rider's attention—the pedals, the steering, and the brake-lever; and to attempt to learn the management of all three simultaneously not only handicaps the novice unreasonably, but is likely seriously to retard his progress.

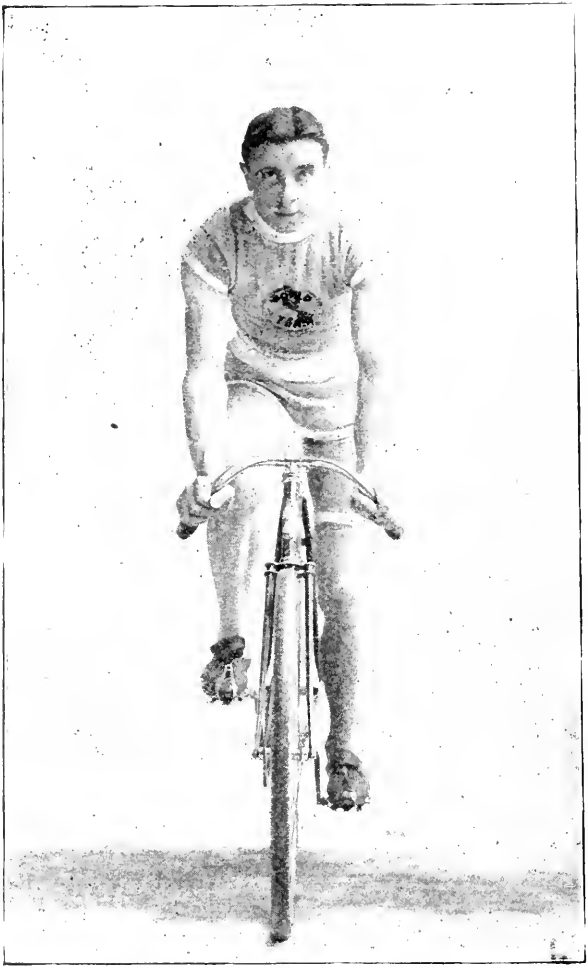
The first few lessons should be taken on a tandem, under the guidance of an experienced friend, who should take sole charge of the steering. The novice is thus at liberty to devote his whole attention to acquiring the art of pedaling, and till he has mastered this to a reasonable extent he should go no further. He will find when he makes his first essays, that even to keep the foot on the pedal is by no means as easy a matter as he imagined. Further, he has not only to keep the foot, but the right part of the foot, on the pedal. At his first attempts he will find that he is tempted to use the waist of the foot, thereby greatly sacrificing power. When he has conquered this, he will further have to correct the proclivity of the natural man for driving the pedal by a succession of vertical plunges, in place of the persuasive rotary motion. This overcome, he should next give his attention to acquiring the proper ankle motion, whereby the power of the stroke is sustained practically all round the circle. Natural aptitude, of course, differs; but if the novice has acquired in half a dozen lessons a fair amount of dexterity in the management of the pedals, he will have made a good progress. When (but not until) the pedals give him no further trouble, he may change seats with his instructor, and on some good road, not too much encumbered with traffic, take his first lesson in steer-

FRED LOUGHEAD.

ing and in the management of the brake. After two or three lessons, the steering, like the pedaling, should have become unconscious, so to speak, and he may then make his first essay, still under the guidance of his friend, upon a single machine. Meanwhile, his instructor, if he be competent, will have kept him from the formation of sundry bad habits; that is, turning his toes out, sitting askew, swaying from side to side, twisting the shoulders, making one leg do the lion's share of the work, etc.; habits which, if once acquired, take an infinity of trouble and pains to eradicate. He will further have instructed him in the rule of the road, and in such but important matters as looking over the nuts of the machine before starting, oiling-up, the management of the lamp, and the hundred-and-one things, small in themselves, which go to make a practical rider.

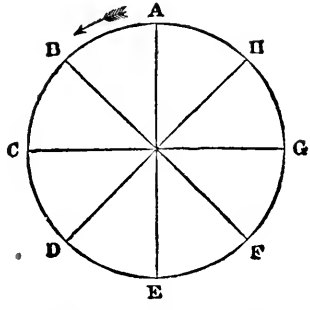
PEDALING.

One of the most important differences between a good and a bad rider lies in their respective pedaling. The action of a novice or a badly taught rider usually consists of a succession of downward "plunges," applied to each pedal alternately and exerting effective pressure for at most one-third of its total revolution. The expert, on the other hand, maintains the effective impulse during the whole of each revolution. This is partly achieved by mechanical aid, in the shape of a grooved shoe-sole and partly by a peculiar movement of the foot and ankle, only to be acquired in perfection by long and careful practice. A reasonable amount of proficiency, however, is within the reach of every cyclist. It will be remembered that we have advised that the first lessons in riding should be taken on a tandem, with an experienced friend in the steersman's seat, so that the learner shall have absolutely nothing to think of save the proper management of his feet. Even in the case of a more advanced rider, if he has from any cause failed to acquire a good style of pedaling the same plan may be adopted with advantage. The first point is to ascertain that the saddle is fixed at exactly the right height. If it be either too high or too low perfect pedaling is out of the question. When fairly seated, with the pedal at its lowest point, the ball of the foot resting upon it and the leg fully extended, the heel of the rider should be an inch and a half or two inches lower than the toe. This is not the position which the foot will occupy in actual work, but if the rider attempts to ride "longer" than this, *i. e.*,



JAY EATON.

with the saddle so raised that he cannot depress the heel as described, there will be a material loss of power at the lower part of the stroke. Being thus duly seated, let the rider begin to peddle, to keep up the "push" upon the pedal all way around. The annexed diagram represents the circle made by the pedal in its revolution.



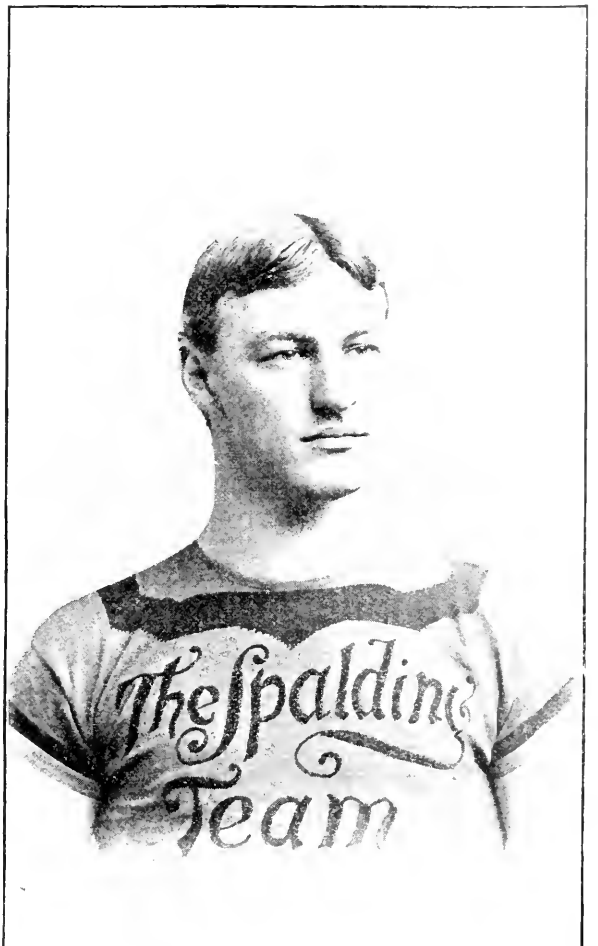
When the pedal is at the point A the rider's foot is naturally at its highest point, and he will find that its most effective position in order to impart the necessary downward and forward movement will be with the heel considerably depressed. From this point to the point D the foot should become gradually more horizontal, and from D to the toe should droop very slightly (the foot, with the aid of the groove in the sole, pulling the pedal around) until it passes the point F, when it should revert to the horizontal position. From this point to H the foot should rest as lightly as possible on the pedal, so as not to impede its upward movement, the toe meanwhile rising and the heel becoming more and more depressed until it reaches H, when it will be in the right position to push the pedal forward again. It will be seen in pedaling as described, the impelling force is fully maintained from H to F and even through the remainder of the circle the pedal may be considerably "helped" by the foot, the early commencement of the forward stroke being equivalent to the "catch" of the practiced oarsman. The novice does not begin his stroke until the pedal has reached or passed the point A, and discontinues it at D or thereabouts. The difference of the result produced is therefore not to be wondered at. In this brief description and in treading fair and square with both feet equally, lie the whole art and mystery of scientific pedaling. But it is by no means so easy

TOM AND NAT BUTLER.

as it reads in print. Only a chosen few acquire it in perfection. A much larger class, wherein the writer may include himself, know exactly how it is done and try to do it, but only succeed in an imperfect and modest degree. The majority of cyclists, it is to be feared, neither know nor care anything about the matter, but by sheer strength of muscle somehow or other manage to push along their machines at a pretty good pace and therewith rest contented. The true wheelman, however, should have a higher ambition. "What is worth doing at all is worth doing well," and the maxim has a special application to cycling.

DISTANCE.

How fast and how far it is wise to travel the experienced wheelman will settle for himself. A word of counsel on this point may not be out of place. The absolute novice, riding for the first time, will be wise to limit to three miles or even less. Even in this short distance the exercise of a set of untrained muscles and (in a whisper be it said) the friction of an unaccustomed seat will be quite sufficient to cause considerable stiffness and soreness. The novice, in his new-born ardor, may be willing enough to ride double the distance named, but if he does so he will be decidedly uncomfortable on the morrow. If, on the other hand, he limits himself to our modest allowance he will be a little stiff perhaps, but fit and ready for a fresh attempt, which may extend a mile farther. Continuing after the same fashion, under proper guidance, he will find himself at the end of a fortnight able to ride twelve or fifteen miles without difficulty. From this point to twenty or thirty miles a day will be only a matter of practice, but the principle of gradual increase, both as a matter of comfort and of health, should be steadily adhered to. When the novice has ceased to be a novice, and has earned the right to call himself a wheelman, he will be able to undertake still greater distances. A young and vigorous rider, in proper training and on a good machine, thinks nothing of a fifty or sixty mile run, but for middle-aged and less muscular riders, Dr. Richardson's rule of six miles an hour for six hours a day is a very fair one, though recent improvements in construction have made thirty-six miles a much lighter day's work than the same distance was at the time when his limit was laid down. It is a good thing to be able to cover fifty miles at a pinch and we should hardly be disposed to consider any person a cyclist who could not do so, but if health and comfort be the first consideration, thirty-six miles will be found an ample day's work for most riders. For ladies ten or fifteen miles or less may very well suffice.



WALTER SANGER.

HILLS.

One of the first things to strike the novice on first taking to cycling is that the world is much more hilly than he has hitherto been accustomed to consider it. Roads, which, while he was a mere pedestrian, he had been accustomed to regard as level, he now finds to possess a very decided slope, and welcomes them on the reverse, according to the direction in which he happens to be going, with quite a keen personal interest. Such gentle gradients as these will give him little trouble, but when he comes in the early stages of his career, to a really stiff hill, whether up or down, he will not find the matter quite so simple, and he may be glad of a word of advice beforehand how to deal with it.

First, as to "up-hill."—If, as often happens, there are two hills, with more or less valley between, the descent of the last few yards of the one will enable him to get up an amount of "steam" which will materially help him in ascending the other. If the hill to be climbed be not too long or too steep, the best plan is to rush it; that is, to force his way to the top by a short but intense effort. If, on the other hand, the ascent be of any considerable length, the attempt so to deal with it would only exhaust the rider. In such case he must husband his strength, pedaling vigorously, but slowly, and making sure that every particle of every stroke tells. The successes of the best hill climbers are mainly dependent on this economy of power.

No cyclist should shirk a hill fairly within his powers, for it is by steady perseverance in the face of difficulties that powerful riders are made; but so soon as the cyclist finds that he cannot proceed without actual distress, and in particular, if he is conscious of undue strain on the heart and lungs, he should at once dismount and walk, pushing his machine before him. And in this matter each must be the judge for himself. The fact that A is able to mount a certain hill is not the smallest reason that B, perhaps two stone heavier, and mounted on an inferior machine, should be able to do likewise, and if he persists in making the attempt, he may have grave reason to regret it. "Fair and softly" is the best rule. Hill-climbing, like all other branches of cycling, is a matter of practice, and every hill the rider mounts, within due limits, will render him the better able to attempt another.

Meanwhile, the best rider must be content to push his machine occasionally. The necessity is unpleasant, especially with bicycle-steered machines, for the rider has constantly to

P. T. POWERS,
Amateur Cycle Racing Association.

lean forward in order to reach the handles, and the central axle bearings are apt to come in unpleasant contact with his knees.

Next, as to "down-hill" riding. The novice is probably of opinion that any body can ride down hill, and so he can; but it is desirable to arrive safe and sound at the bottom, which is not quite such a matter of course. If the aspirant—as some aspirants seem to do—regards a hill from a tobogganing point of view, as a descent to be "rushed" at the speed of an express train, his cycling will soon come to an abrupt conclusion.

A cautious rider treats hills, particularly unknown hills, with all possible respect. He takes care to keep his machine well in hand until he can see to the very bottom of the descent, and even then, should the hill terminate in a road at right angles to his course, he will slacken speed in ample time before he reaches the bottom. Further, knowing his machine and the extent of his brake power, he will never allow the machine to acquire such a momentum as to make him unable to stop it within, at most, half a dozen yards. And without full confidence in his brake he will be very chary of riding down a hill of any considerable gradient at all.

Back-pedaling is often a valuable auxiliary to the brake in going down a hill; but, in many of the modern machines, keeping the feet on the pedals in descending a steep hill, has a tendency to throw the rider too far forward, and it becomes almost a necessity for the sake of balance, to travel "legs up." Hence the imperative need of a brake that shall be thoroughly trustworthy, without any extraneous assistance.

STIFFNESS OF THE LIMBS.

In the early days of his bicycling experience, it is a common thing for a beginner to find himself rather stiff and sore after riding; and even after he has passed his novitiate, and may fairly call himself a wheelman, the same complaint will now and then recur at the commencement of the season, or after an exceptionally hard day's work.

The best of remedies for such a state of things is a warm bath, and a good rub down afterwards with the following combination.

1 pint vinegar; ½ gill spirits of turpentine; 4 raw eggs (whites only), well beaten up.

FRED TITUS.

The above, variously known as "white oils," "nine oils," etc., is a favorite veterinary remedy. It is practically identical with a celebrated proprietary liniment, and artful old trainers now and then sell the recipe as a special "tip," deserving of handsome recognition. Some authorities recommend the addition of half a gill of oil of thyme. Strains, bruises and stiffness disappear as if by magic under an energetic application of this remedy, which is, moreover, an excellent specific for insect bites.

FOOD.

With respect to food, the cyclist (unless in strict training) may eat pretty much what he pleases, but on the other hand, should not eat too heavily of anything, particularly if he is obliged to commence or continue his ride very shortly afterwards. Pastry is best avoided, as being indigestible, and tending to shortness of breath.

WHAT TO DRINK.

The best work in cycling, as in most other cases, is unquestionably done on non-alcoholic drinks. The great achievements of the record makers, particularly for long distances, have almost invariably been performed under total abstinence conditions. When the day's work is over, if the cyclist feels inclined to take his glass of lager beer, his pint of claret, or even his single jorum of whiskey and water, we know of no particular reason why he should not do so. But while actually riding, the less he drinks of any liquid the better, and especially of alcoholic liquids. Even the most attenuated mixtures, the modest shandy-gaff or the seductive beer, are but snares and pitfalls to the wheelman. The temporary stimulus passes away ere the second milestone is reached, and the rider finds himself jaded and feverish, probably for the remainder of the day. Alpine climbers have the same experience. The best plan is not to drink at all save with meals. The mouth may be rinced out when opportunity offers, but actual drinking is best avoided. If, however, the cyclist must drink between meals, his best plan will be to carry a pocket flask filled with weak tea, without milk or sugar, and put his lips to it like Mrs. Gamp, "when so disposed." For those who may find plain

ARTHUR A. ZIMMERMAN.

tea unpalatable, Dr. Richardson advocates milk tea; that is, tea made with boiling milk and water, instead of plain water. This may be sweetened, if preferred, and if made pretty strong, will bear dilution with cold water. A raw egg beaten up in milk is a capital reviver, when obtainable. The two together are said to contain every needful element of food. Where the combination is not to be had, milk alone is by no means to be despised. Water or soda water may be added, or not, at pleasure. Personally, we approve the addition, as making the milk both more thirst-quenching and more digestible; but this is a matter that may be safely left to the taste of the individual rider. Whatever the drink, it should be sipped slowly. A pinch of oatmeal stirred up in a tumbler of water, is said to be an excellent drink, not only thirst-quenching, but sustaining.

TOM ECK,
Manager of the Spalding Team.

HARD AND SOFT TIRES.

The relative merit of hard and soft tires is a fruitful theme for argument. The common impression is that while hard tires may be better for speed, soft tires are more conducive to comfort, and consequently many riders deliberately use tires that are insufficiently inflated. The majority of cyclists, however, pay almost no attention to the degree of inflation of their tires and only pump them up when they discover in riding that they are thoroughly flat. Those who feel of their tires before starting on a ride ordinarily test them by pressing down on them with their fingers or by grasping the rubber between thumb and forefinger, but by neither of these methods can there be exerted a pressure that is at all comparable with a rider's weight. The only method that will show how the tire will compress when ridden is to place two fingers of each hand near together beneath the rim and, holding firmly, press as hard as possible into the tire with both thumbs. This will give some idea of the compression that will take place during riding, though it will not equal it, and will vary according to the strength of one's fingers.

Experiments made with tires inflated to various degrees of hardness show that very hard tires have a constant degree of elasticity under all degrees of compression. A rider who has once become accustomed to them is made uncomfortable by a small reduction of inflation and very quickly feels a drag in his machine. As tires become less and less inflated they compress easily under small pressures but less readily as the pressure increases. They are most comfortable when vibrations are small, but a compression of three-eighths of an inch is the maximum that can be safely allowed.

As about two-thirds of the weight is usually carried on the rear wheel and as that wheel also does the work of driving, the rear tire needs to be a good deal harder than the front one. A tire correctly inflated should show but little bulging at the sides when the rider is on the machine. But because the front tire carries only one-third of the weight it must not be allowed to get too soft. The more it compresses the more it affects the steering, the tendency of a very flat tire being to resist the free movement of the wheel from side to side. Those who have ridden with punctured tires know the unpleasantness of the sensation. A flat rear tire may be ridden slowly without such great discomfort, but a flat front tire resists the action of steering to a very disagreeable extent and makes riding almost unbearable.

CHARLES A. CHURCH,
Philadelphia.

CYCLING AND WALKING.

Interesting Scientific Experiments Which Demonstrate That Cycling Is the Easier of the Two Exercises.

This is a question one frequently hears asked, especially by those who have no practical experience of the cycle. Some do not even admit that it is easier. To them it appears paradoxical that to propel one's own body and a bicycle should be easier than to propel the body alone. But to practical cyclists it is a fact beyond dispute—a matter of everyday experience and any person can, after a season's practice, ride fifty miles as easily as he could walk fifteen.

Divers reasons are put forward in explanation of this; such as the smooth and equable motion of the bicycle; the speed and the consequent exhilaration produced by inhaling more oxygen; the continual change of scenery beguiling the tedium of the way, etc. All these have their effect; but there is, I believe, a solid mechanical advantage possessed by the cycle over the natural means of progression, which lies at the bottom of the mystery. A short discussion of this may not prove uninteresting.

Some seven years ago when the writer was an undergraduate he attended lectures of a certain professor who was fond of illustrating mathematical principles from examples which would appeal to his audiences. In this way the very question which heads the article cropped up, and was disposed of in the way I am about to describe. It is so simple that it cannot be new, and yet I do not recollect having seen it in print; at least not in a cycling paper.

The basis of this explanation is that walking is a horizontal but undulatory motion, whereas cycling is a horizontal motion in a straight line (the road inequalities being disregarded).

The truth of the first proposition is evident. When a man walks his legs are alternately side by side for a moment, and both touching the ground some distance apart for a moment. The legs may be considered as describing alternately arcs of a circle, whose center is the hip joint, the radius the length of

C. C. F. SCHWARZ,
One Mile Philadelphia Champion.

the leg. Now, when the legs are side by side the whole body is in a straight line, at its greatest height above the ground. But when the legs are stretched apart, each foot touching the ground, the distance of the body from the ground is no longer the length of the leg, but somewhat less. The legs are in this case in position like an inverted V, and the distance of the vertex of the letter form a line joining its extremities is obviously less than the length of either leg. For if the extremities are joined, making a complete triangle of the letter, and if then a vertical line be drawn equal in length to either of the sides from the vertex of the triangle downwards, it will be found to project below the base line, But this central line occupies the position of the legs when side by side ; hence, the body must be higher when the legs are side by side than when stretched apart in the act of taking a step. The body therefore falls, and it must be raised again before the next step.

This produces an undulatory motion which is inseparable from walking. The amount of undulation varies ; it is supposed to be about two inches in Europeans, but in Negroes much more. At each step therefore the whole body is raised two inches, or the sixth of a foot, and if a man weighs 144 pounds he will have to do 24 pounds of foot work at each step, foot-pound being as its name implies, the force required to raise one pound through one foot. An ordinary space is supposed to be about thirty inches, or two and one-half feet, so that the number of times two and one-half feet is contained in a mile multiplied by twenty-four will give the number of foot-pounds of work which the said man must perform in walking a mile. And be it observed, this is all sheer waste and does not include the force required to propel the body forward in a straight line. It is hardly necessary to prove that a bicycle moves in a straight horizontal line, with the rider on it ; but it is not so easy to find the force required to keep a bicycle in motion. But it can be roughly estimated in this way. A good spring balance is attached to the front of a bicycle and a long cord to the other end of the balance, which an assistant holds. You then mount the wheel, and when it is properly started the assistant runs and tows (another bicycle could do this better). The rider must then put his feet on the rests, and craning forward his neck observe what strain is indicated by the balance. If it be say, seven pounds, then seven times the number of feet in a mile will be the number of foot-pounds of work performed in going a mile. I myself made experiments of this kind and so did other students. The results were very dissimilar. However, our worthy lecturer, who had suggested this method, tabulated the results with the utmost gravity. The average was

CHAS. I. HEIMSTREET,
Prominent Denver Rider.

PETER J. BECKER,
State Champion of Colorado.

about seven pounds, but some were as high as ten pounds, others only five or six pounds. Of course, the rate of towing directly affects the results obtained. The strain of seven pounds appears to correspond with a speed of eight miles an hour. The work done (according to this) in going a pace is ($7 \times 2\frac{1}{2}$) foot-pounds against a waste of twenty-four foot-pounds walking, for a man of ten stone four pounds. This certainly shows a balance in favor of cycling.

The experiments above described were crude in the extreme, and the machines were heavy also. Some readers may possibly investigate the question themselves. A bicycle would be the best to tow with, and there should be a means of estimating the speed corresponding with a certain strain. The road, too, should be quite level, fairly smooth, and the motion not against the wind.

LENDING TO FRIENDS.

One of the most touching passages in a treatise on "Cycling" is that wherein the writers depict the dissembled agony wherewith a practiced cyclist permits his pet machine to be "tried" by a non-cycling friend. Another writer, touching on the same subject, disposes of it with the curt advice: "If you value your machine, never lend it to any body."

This sounds churlish, and we should be loath to endorse so sweeping a recommendation; but it must be remembered, on the other hand, that the loan of a machine is a serious matter, and should neither be asked or acceded to, unless the borrower is known to have full competence for the trust. A man may lend a $5 note with a comparatively light heart, secure in the faith that the amount will be (sooner or later) repaid, and that one $5 note is as good as another. With cycles the matter stands on a different footing. In the first place, every machine demands a certain amount of adjustment to the idiosyncrasies of the rider, and the perfection of such adjustment is only attained after repeated experiments. Position of the saddle, height of handle bar, length of crank-throw; all these are important factors in comfortable riding, and the golden mean once ascertained, should be strictly adhered to. If the machine is lent, even to a practical rider, it will probably come back altered in all these details, and a new course of experiment must be gone through before they can be made right again.

This, however, is a comparatively small matter. Where the machine is lent to an unpracticed friend, the danger is far more serious. In such a case, Polonius' advice to Hamlet—

> Neither a borrower nor a lender be,
> For loan oft loseth both itself and friend—

is not unlikely to receive a new illustration, loan and friend being very apt to be found in a mixed and shattered condition at the bottom of the first hill they come to. It is not necessary to assume special maladroitness on the part of the unhorsed knight, but, as every rider knows from experience, a certain proportion of accident is almost inseparable from one's earlier efforts.

ADVICE TO LADY BICYCLISTS.

We have cogitated much and deeply on this subject. We feel that readers—of the gentler sex, if any should honor our pages, might not unnaturally feel slighted should they find themselves apparently passed over. In truth, however, lady riders have so fully made good their title to the name of cyclists that, with the exception of some minor matters of dress and the like, advice to the one sex is equally advice to the other. We beg our lady friends, therefore, to consider that all our pages are addressed to them, equally with their husbands and brothers. We may, however, be permitted to add, not "for ladies only," but for ladies especially:

Don't ride too fast or too far.

Ride a suitable machine.

Machines adapted for ladies' use are manufactured by all the leading makers. They should be:

Not too heavy.

Not too complicated.

Amply provided with brake power.

Easily mounted and dismounted from.

Don't ride unattended by a male relative or friend; don't accompany any club runs unless especially small and select; always ride in correct cycling costume; stick to the "all wool" principle, and don't have your skirt either too long or too full, these being fertile sources of accident; don't lace tightly; use a Christy Saddle with a short neck, as especially constructed for ladies' use.

When touring, carry your own soap, also a few tablets of chocolate or good Muscatel raisins. These, by way of roadside "pick-me-ups."

Carry a waterproof cape, but don't ride in it.

Carry a menthol cone. Drawn gently over the forehead, it is a capital thing for a headache, or to soothe the nerves when over-fatigue won't let you sleep.

BICYCLING HYGIENICALLY CONSIDERED

WITH SPECIAL REFERENCE TO THE

SEAT OR SADDLE.

BY SANGER BROWN, M. D.

Professor of Medical Jurisprudence and Hygiene, Rush Medical College, Chicago.

Having so strongly indorsed bicycle riding as a healthful form of exercise I must now sound a note of warning of the danger which sometimes results from the practice. This danger has reference to the form of seat or saddle used. The medical journals contain records of many cases where serious damage has been done to the urethra and prostate gland from this cause.

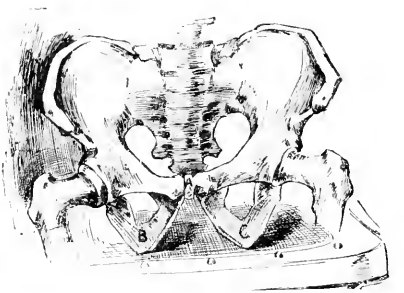


FIGURE I.

In order that the exact manner in which the harm is done in this particular case may be better understood, let me say a few words in regard to the physiology of sitting in general. In sitting properly, as you may see by reference to Figure 1, which represents the bony pelvis seated upon a plain surface, the only

tissues subjected to pressure are the soft parts situated between the bony prominences (the ischial tuberosities), B, C, and the surface sat upon. No permanent injury can result from the pressure of these tissues, because they are composed only of skin, fat, etc., but the tissues which do contain organs peculiarly liable to injury from pressure, namely the urethra and prostate gland, lie beneath and posterior to the bony arch, A, therefore, any form of sitting which involves pressure upon these parts is especially harmful. If a seat is slightly upholstered, pressure upon the soft parts, overlying the bony prominences, B, C, is somewhat disturbed and, therefore, less intense on any given part.

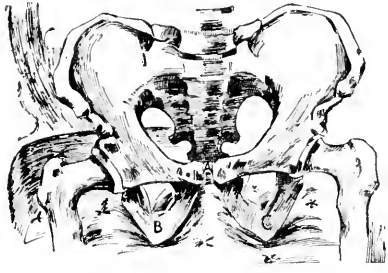


FIGURE 2.

But if the seat is upholstered too deeply it is not practical to keep the material used from packing or otherwise getting out of order, and if frequently used several hours together, the parts in contact with it become uncomfortably heated, thus favoring the development of hemorrhoids; and, worse than this, parts of the upholstering rise up, as shown in Figure 2, and exert pressure upon the tissues lying beneath and behind the bony arch, A, thus injuring the organs therein contained. Now, while slight pressure exerted upon these organs in sitting for a comparatively short time on a deeply upholstered seat causes no discomfort, yet if such a seat be used daily for many consecutive hours, as is the case with office employes, then all the objections just enumerated are found to be of great importance, so that such people invariably use either a very lightly upholstered seat or one which is not upholstered at all.

Figure 3 represents the style of seat or saddle which, with some slight and unimportant modifications, came into use with the advent of the "safety" and is still much ridden. It is known as the ordinary hammock saddle and is too familiar an

object to all bicycle riders to require much description. I may remind you, however, at this point that inasmuch as it simply consists of a strong piece of leather stretched between two

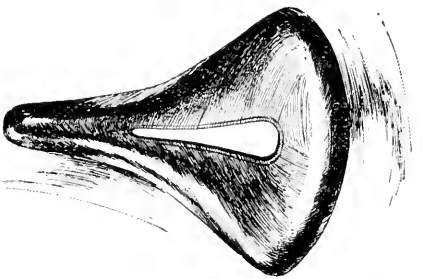


FIGURE 3.

points, connected by a steel spring, its shape changes very much under the weight of the rider; that is to say, it is pressed down in the middle and the ends approach one another.

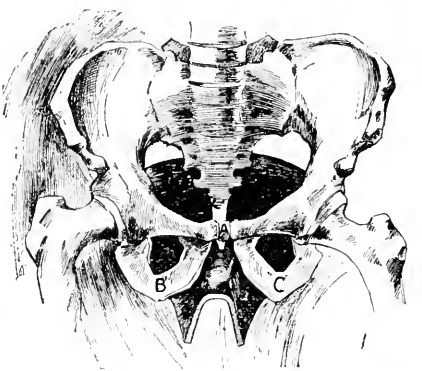


FIGURE 4.

By an examination of Figure 4, which shows the position occupied by the pelvis when seated upon the hammock saddle you perceive that the bony prominences, B, C, are not supported at all and that the soft parts immediately underneath

and posterior to the bony arch, A, bear the entire weight of the body; that is the prostate gland and that part of the urethra lying in the tissues beneath this arch are exposed to constant pressure and irritation. Now, no more objectionable form of seat could possibly be devised than this one; nothing could be contrived which more outrageously violates the physiological principles of sitting.

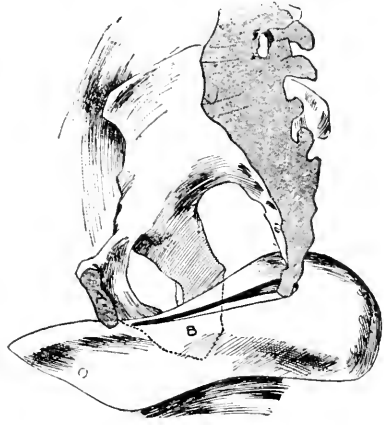


FIGURE 5.

Figure 5, which represents a side view of the pelvis seated upon the same kind of saddle, shows, rather more clearly in some respects than Figure 3, just how the weight of the body is supported and how the tissues, beneath and behind the bony arch, A, are subjected to pressure and irritation.

FIGURE 6.

Figure 6 represents another style of saddle much in use, made of solid material, as wood or metal, and covered with leather.

It has been brought forward as an improvement upon that represented in Figure 3. It has graceful curves and looks very much like a miniature equestrian saddle, having both a horn and cantle. Its beauty and the sentiment commonly entertained in regard to an equestrian saddle doubtless has had much to do with making it popular. The upper surface is made to conform to the soft parts, thus securing a wide distribution of pressure, not unlike that supplied by a deeply upholstered seat, and when first sat upon it is extremely comfortable, for the same reason that a deeply upholstered seat is comfortable, but it is open to even greater objections, because, in the deeply upholstered seat a considerable portion of the pressure is distributed to parts about the circumference of the buttocks, thus considerably diminishing pressure upon the perineum (the

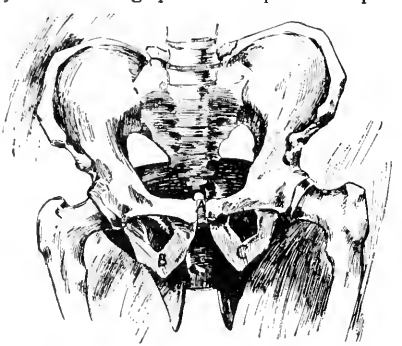


FIGURE 7.

anatomical name of the soft parts lying immediately beneath and behind the bony arch, A, and containing part of the urethra and prostate gland), while in this seat the perineum and the neighboring parts receive nearly the whole pressure.

By seating the bony pelvis on this saddle, however, as shown in Figure 7, it is seen that the bony prominences remain unsupported and the perineum is brought firmly in contact with the pommel; thus it is open to the same objection that belongs to the hammock saddle. In some specimens of this seat an attempt has been made to mitigate the injurious pressure on the perineum by supplying the pommel and other parts of the saddle with a cushion. This device seems rational, but the purpose of a cushion being to distribute pressure and the pommel of the saddle being so narrow the pressure, notwith-

standing the cushion, falls mainly upon the perineum and thus a fatal violation of the essential elements of a properly constructed seat results.

The term saddle is really an unfortunate one because it implies something to straddle. A bicycle is a vehicle and in no sense a horse and, therefore, the rider from the very nature of the case should have something to sit upon rather than something to straddle. The upper surface of an equestrian saddle is so broad and flat that the perineum is exposed to little if any pressure unless the rider is thrown forward upon the pommel, while a bicycle seat must permit the feet to come close together, and a little reflection will convince any intelligent person of the absurdity of attempting to preserve in it the contour of an equestrian saddle. I must insist that the term saddle, used in relation to a bicycle, has been responsible for much damage and should be abandoned, the protests of the sentimentalists who like to speak of a wheel as a steed, notwithstanding.

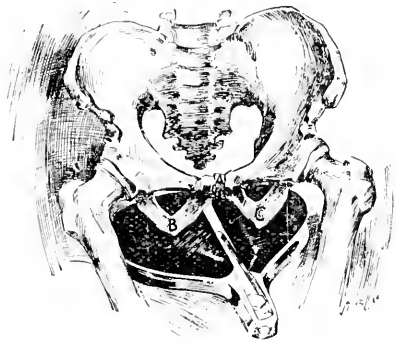


FIGURE 8.

Figure 8 shows the pelvis resting upon a form of bicycle seat which is entirely safe because the weight of the body is supported precisely as it is upon a chair or stool. This seat has a firm metal base which does not change its form when subjected to the weight of the body. It is supplied with curled-hair cushions of a degree of firmness and thickness which suffices to distribute the pressure somewhat, without having any of the objections which have been previously alluded to as belonging to a deeply upholstered seat. Here there is no possibility of

pressure falling upon the perineum, the bony arch, A, and the parts beneath it being so high above the surface of the seat. The projection forward cannot be regarded in any sense as a pommel, and you perceive it is so far below the plane or level of the perineum that it cannot possibly come in contact with it, so that on anatomical or physiological grounds it can exert no harmful pressure no matter how far forward it projects; while it is of great value in rapid riding or riding over a rough road, for, by bringing the inner surface of the thighs in contact with it, the rider feels far more secure in his seat.

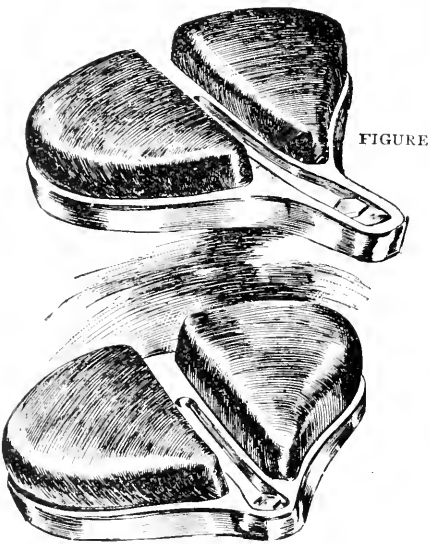


FIGURE 9.

FIGURE 10.

Figure 10 shows a form of this seat which is designed for the use of ladies. The projection forward is only shortened in order that it may not interfere with the skirts, and not as a concession to the prejudice of those who, knowing that in some other forms of saddles the horn or pommel is an element of danger, might, therefore, think it ought to be done away with. As women have no prostrate gland and the situation of the

urethra is such that it cannot be pressed against the under surface of the bony arch, A, they are much less liable to serious injury from riding any form of saddle than men are. In young girls, however, the friction incident to riding a faulty form of saddle has not infrequently resulted in the formation of pernicious habits.

Some extra care should be exercised in adjusting a seat with an unyielding base. It should be so placed that the posterior part of the thigh does not come into forcible contact with its anterior edge. The objection is obviated by not fixing the saddle too high, so that when the pedal is in the lowest position the leg remains somewhat bent. It should be borne in mind that many of the objectionable forms of saddle, on account of their more exact conformity to the soft parts and the correspondingly greater distribution of pressure, will be pronounced more comfortable when first ridden than this more correct form, just as a deeply upholstered seat will be pronounced more comfortable at first than a comparatively hard one, but any temporary discomfort which the rider suffers from when first using this correct form will soon disappear after he has properly adjusted it and ridden a few times. Finally, then, from the foregoing considerations, when you wish to determine whether a given bicycle seat is a safe one to ride or not, it is only necessary to place (a real or imaginary) bony pelvis upon it, as shown in Figures 4, 5, 7 and 8. If support is provided for the ischial tuborosities, B, C, and the construction is such that no pressure is exerted upon the tissues lying beneath and posterior to the bony arch, A, substantially as shown in Figure 8, you may have no hesitation in pronouncing the seat a safe one. But, if on the other hand, the bony prominences, B, C, are not properly supported and pressure falls upon the tissues beneath and posterior to the bony arch, A, then you must pronounce such a seat or saddle dangerous if much ridden.

And one thing further, I have seen a number of seats so constructed as to present somewhat the appearance upon the upper surface presented by that shown in Figures 9 and 10, but they were provided with a leather instead of a metal base, and would therefore, when the weight of the rider was thrown upon them, alter their shape, the bony prominences pressing down the outer edges and thus forcing a ridge upward in contact with the perineum. So that before pronouncing upon a seat you must not only determine whether or not the form is correct as you inspect it, but you must ascertain whether or not it may assume an improper or dangerous form when ridden.

THE FORM OF BICYCLE SADDLES

IN ITS RELATION TO THE

PATHOLOGICAL EFFECTS OF CYCLING.

By G. Frank Lydston, M. D.

Professor of Surgical Diseases of the Genito-Urinary Organs, Medical Department of the University of Illinois.

When the modern fad of bicycling first began, its importance, from a medical and surgical standpoint, was not appreciated by the medical profession, save in so far as the bicyclist presented himself, from time to time, suffering from the results of accidents experienced while riding. Since the practice of bicycling has become so universal, however, the question of both immediate and remote pathological disturbances incidental to it has assumed a position of the greatest importance. This is especially true of the genito-urinary practice—the especial field in which the disturbances produced by bicycling are most often noted. I recall that I was at first inclined to ridicule the notion that the practice of bicycling was likely to be productive of any pathological conditions that could justly be said to be peculiar to that special form of exercise. Extensive clinical experience has since taught me, however, that the bicycle must be given a very important position in the etiology of genito-urinary diseases.

The instances in which the motion of the limbs necessary to propel the bicycle is productive of injury are relatively rare. It is true that the motion *per se* is a factor that deserves consideration; but it is a matter of relatively minor importance save where some acute disease exists, in which event the objection is not to bicycling especially; but to any kind of exercise involving movements of the lower limbs.

It is not my purpose to discuss in detail the various forms of pathological disturbances that may be produced by bicycling. A few remarks anent this point would seem to be demanded,

however, for the purpose of showing more clearly the practical character of the subject under consideration.

There has recently appeared in the various medical journals considerable discussion of the different varieties of disease—organic or functional—that may be produced by bicycling.

I am convinced that in many instances extreme and unwarranted deductions have been made and unreliable opinions have been formed. Thus, certain writers have claimed that acute urethritis may be produced by bicycling. I have no desire to appear dogmatic, but I must take the liberty of expressing the opinion that no amount of bicycling can possibly produce acute inflammation of the urethra. That injury of any portion of the urethra, produced in riding a wheel or in mounting or dismounting, may induce simple urethritis, is undoubtedly true, but that bicycling in itself can produce supurative inflammation of a previously sound urethra, I do not believe. In the presence of pre-existing conditions of disease, however, bicycling may produce an acute exacerbation of chronic inflammation. This is one of the most important points for consideration by the surgeon. Careful observation of an abundance of clinical material has convinced me of the importance of this. Acute exacerbation of inflammation—aggravation of acute or chronic inflammation already existing—is very frequent. That irritation of the urethra, prostrate, and bladder neck is often produced by bicycling I am firmly convinced. Irritations of the genital organs in both the male and female, which irritations may lead to chronic inflammatory trouble, are, unquestionably, often produced by bicycling. Diseased conditions of the genito-urinary organs are not only liable to be produced by bicycling, but also diseases of the associated parts. It is by no means unusual for patients suffering with hemorrhoids to complain of aggravation of their trouble due to riding a wheel. Persons previously free from hemorrhoidal trouble may develop it by bicycle riding. Variocele may be produced in a similar manner.

A careful and unprejudiced study of the injurious results of bicycling will convince any painstaking observer that the most important factor in the question of bicycling is, from a surgical standpoint, the conformation of the bicycle saddle. The form of the saddle determines the question of disease due to a form of exercise which, under proper limitations, is admirable in its effects and most highly to be commended. The surgical importance of this particular point is my apology for its special consideration.

The first form of saddle that was devised for the bicycle was, from a surgical standpoint, the very worst form that could have

been devised. This, however, was due to the complete ignorance both of riders and the manufacturers of bicycle saddles as to the function which was to be subserved by the saddle and the still denser ignorance, if possible, upon the anatomical, physiological and disease questions involved. It was perfectly natural that bicycle riding should have been considered by the laity as almost, if not quite, identical with horseback riding, in so far as the support of the body by the bicycle saddle was concerned. The public had had much experience with the horse saddle, and it was, therefore, not surprising that the conformation of the bicycle saddle should have been made to conform to the ordinary horse saddle. The graceful lines and curves of the latter appealed very forcibly to the public as the ideal standard for conformation of the bicycle saddle. Even at the present time the layman who selects a bicycle saddle is most likely to favor that form which presents the broadest curve and conforms most nearly to his ideas of the saddle as he has formed them from his knowledge of the conformation of the horse saddle. If the superior plane of a bicycle saddle does not present the curved plane characteristic of a horse saddle, and if the bicycle saddle has no pommel, the layman will, as a rule, have none of it.

The average bicycle rider seems to think that the bicycle saddle is designed to be straddled in the same manner that he would straddle the back of a horse ; when, as a matter of fact, there is the widest difference between the function of the horse saddle and the form adapted to the bicycle. In the case of a horse saddle, however, there are such broad surfaces for the support of the body, that the weight must necessarily be equally distributed over a large area. In addition to this fact, a certain portion of the weight is borne by the thighs, the gripping action of which is familiar to every equestrian. Another point that must be considered is the fact that even in the equestrian saddle the pommel is by no means necessary, and is often dangerous. Most of the accidents produced by the saddle in equestrianism are due to the sudden impact of the body, particularly the perineum and genital region, against the pommel of the saddle. This is a fact which is sufficiently familiar, and yet the pommel idea is paramount in the minds of a large proportion of the laity and many manufacturers of bicycle saddles. The surface of the equestrian saddle is so broad and support by the pressure of the thighs is so easy, that slipping forward is not so very likely to occur unless some accident happens, such as the sudden stoppage or falling of the horse. With a bicycle saddle of similar shape, however, it is practically impossible for the rider to avoid slipping forward upon the small curved plane

of the saddle, thus bringing the pommel in contact with the perineum and genital organs. The function of the bicycle saddle is not to support the weight of the rider sitting astride ; on the contrary, its function is to support and balance the weight of the rider sitting squarely upon it, very much as a small chair or stool might do. Irrespective of its conformation, no bicycle saddle is rational that does not perform this function, and any other function it may be made to subserve is entirely superfluous.

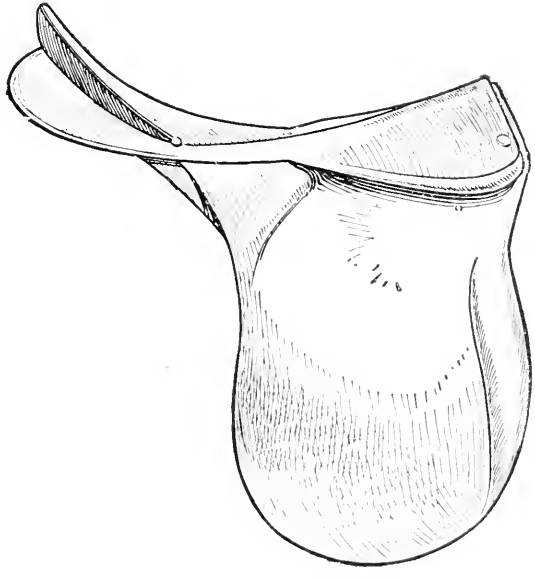


FIG. 1.

The conformation of the horse saddle is so familiar that a typical illustration is hardly necessary, and yet, perhaps, it will be useful for the purpose of comparison. The saddle shown in the illustration is the form that is preferred by most equestrians.

A moment's reflection will show that the horse saddle is not only designed to meet the demand for the support and comfort of the rider, but also for the comfort of the living animal that carries the rider. It must also be made to conform to the

shape of the back of the horse. It will at once be seen that there are certain conditions to be fulfilled in the structure and conformation of the horse saddle that do not exist in the case of the bicycle saddle. Ideas of the proper conformation of the bicycle, based upon that of the horse saddle, are therefore manifestly absurd, and yet the most popular saddle with the

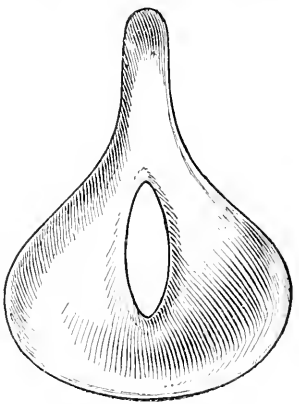


FIG. 2.

laity has hitherto been a form that is practically a horse saddle in miniature, a typical illustration of which is seen in Figs. 2 and 3.

In using this saddle the rider must necessarily sit astride it. The pommel is not only a ridiculously prominent feature of the saddle, but the curved plane of its upper surface—which is

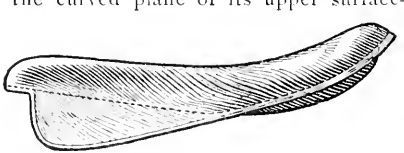


FIG. 3.

accentuated posteriorly—must necessarily force the rider forward, so that the weight of the body rests upon the sharply projecting anterior portion. Not only is the weight of the body supported largely by the front part of the saddle, but certain sensitive anatomical points are brought to bear upon it

in such a manner as to produce injury. As far as injurious pressure is concerned, the pommel of the bicycle saddle is much more objectionable than that of the horse saddle.

Figs. 4 and 5 show a bicycle saddle which has been used

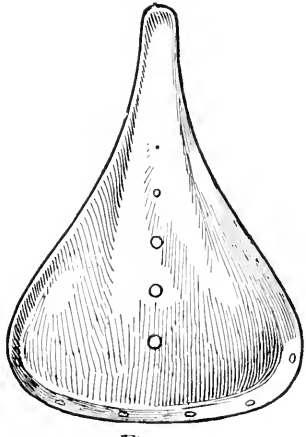


FIG. 4.

quite extensively, and which is little short of a monstrosity from the standpoint of anatomical adaptation. No more injurious form of bicycle saddle could well be devised.

It might be well to call attention to the fact that in these faulty forms of saddles, the injurious effects are likely to be overlooked because remote. I will admit that these faulty

FIG. 5.

forms are often comfortable enough at first, unless the rider be subjected to severe jolting, but the pressure and friction incidental to the faulty conformation produce results which are none the less definite because gradually developed. I find that in a large proportion of instances in which bicycling has

produced disturbances distinctly referable to a faulty conformation of the saddle, the subject claims that he has been perfectly comfortable while riding and has not been aware of any injurious pressure at any time. This is the point that is quite likely to deceive manufacturer, rider and surgeon.

On account of the fact that many riders who are not inured to exercise of any kind, and particularly bicycling, complain of

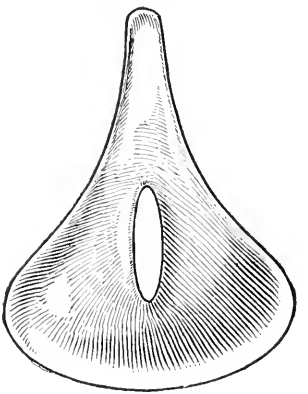


FIG. 6.

the unyielding character of the ordinary bicycle saddle, attempts have been made to afford a soft, yielding, and at the same time, firmly supporting cushion. The result has been the pneumatic saddle of various forms. One of these is shown in Figs. 6 and 7. It is true that the average rider will find one of these saddles a very comfortable seat at first, but the sense of insecurity and fluctuation soon becomes very annoying. In

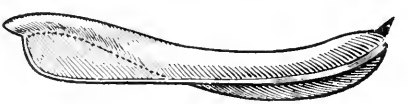


FIG. 7.

addition to this fact, the support afforded is ringlike in character, and disturbance of the circulation of the parts included within the area of pressure inevitably results. This form of bicycle saddle is especially liable to induce the development of hemorrhoidal disease. Comfortable as the pneumatic saddle

may appear to be, pressure is likely, sooner or later, to develop such trouble. It is well known to the practical surgeon that while a soft cushioned chair is more comfortable to sit upon, the man or woman who sits upon it continuously is very likely to develop hemorrhoidal disease. The individual who sits upon a hard, unyielding chair or stool may experience a sense of fatigue and be otherwise more or less uncomfortable on account of the hard, unyielding character of the surface upon which he is sitting but by comparison, he exceptionally develops hemorrhoidal disease. The weight of the body in the sitting position should be supported by the tuberosities of the ischii. (Points *a*, *b*, Fig. 11.) Sitting upon a soft cushion or saddle, those parts upon which the body should normally rest in the sitting posture are relieved of pressure, to a great extent, the pressure being distributed over other parts and producing more or less disturbance of the circulation and, a point which is of almost equal importance, overheating the parts.

In the special form of pneumatic saddle shown in the above illustrations, the pneumatic element of the device simply serves to throw forward the weight of the body in such a manner that the pommel of the saddle comes in contact with the perineum and associated parts, so that the saddle really defeats the object for which it was designed, namely, the prevention of injurious pressure. I will call attention to the fact that the distribution or equalization of pressure which is aimed at in pneumatic devices is not at all logical, because it protects parts which cannot possibly be injured by the pressure of the saddle, whereas the deep urethra and prostate in the male and equally sensitive parts in the female, are not only not protected absolutely from pressure, as they should be, but the measure is accentuated. In order that a bicycle saddle shall conform to anatomical demands it must fulfill the following requirements:

1. It should be so constructed that the weight of the body shall rest upon the broadest part of the saddle.

2. The weight should be supported entirely upon the tuber ischii. (Points *a*, *b*, Fig. 11.)

3. The saddle should be broad enough to avoid the necessity of the anatomical points of support resting upon its edge.

4. The plane of the saddle should be as nearly level as possible, so that the relation of the saddle to the anatomical points of support of the body is the same as the supporting plane of a chair would be.

5. There should be no upward projection of the saddle anteriorly, which by any possibility can come in contact with the perineum or genitals.

6. The structure of the saddle should be moderately firm,

the jolting being reduced to a minimum, not by an elastic cushion, but by springs beneath the saddle.

If these requirements be fulfilled the delicate anatomical points, pressure upon which is likely to produce injury in bicycle riding, can in no way be brought in sufficient intimate relation to any part of the saddle to produce injury, either immediate or remote. The base of the saddle should be unyielding, so that the plane of support upon which the tuberosities of the ischia rest (Fig. 11) cannot be forced downward by the weight of the body in such a manner as to bring any portion of the saddle in contact with the perineum. If the saddle be properly constructed there is no pommel or horn, properly speaking; still, if made of yielding materials, it might be possible for the anterior portion of the saddle to be

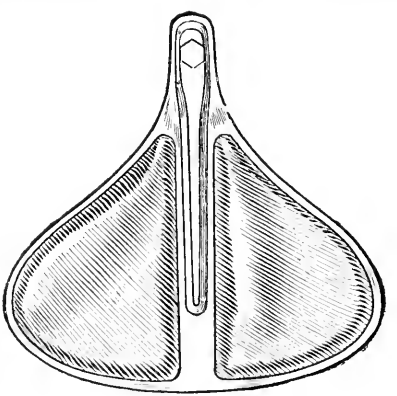


FIG. 8.

impinged upon by the perineum as the base of support gave way under the pressure of the body. Inasmuch as the support should be afforded entirely to the bony prominences of the buttocks, there is no necessity for any point of support in the middle line or perineum; hence there is no necessity for upholstering the saddle at this point. Should it be upholstered in the middle line it would be impossible to raise the perineum out of the way of dangerous pressure without building up the saddle to a preposterous height on either side.

Figs. 8 and 9 show the only form of saddle which perfectly fulfils the requirements outlined. This saddle is the form de-

signed for male riders. The projection anteriorly is not designed as a pommel in any sense whatever.

The frame or foundation is of sheet steel, molded to the proper shape. The cushions for the support of the buttocks are upholstered with curled hair. This is the only material possessing sufficient softness and elasticity which is at the same time so firm and unyielding as not to change its shape under

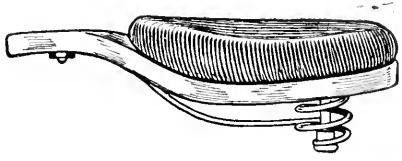


FIG. 9.

the weight of the rider. The anterior projection or horn is so far below the surface of the cushions on which the buttocks set that it cannot possibly come in contact with the perineum. In riding at high speed or over very rough roads the support that the rider may derive from it by pressure of the inner surface of the thighs adds considerably to his security. The horn is sometimes dispensed with, as shown in Fig. 10, a form designed

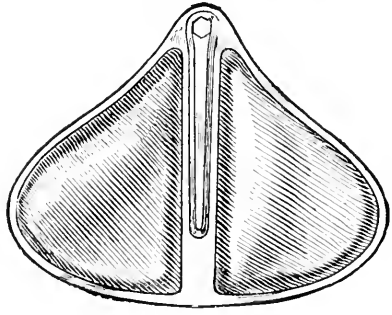


FIG. 10.

for female riders, in whom the skirts are likely to become entangled with the horn of the saddle. The absence of the horn seems to in no way impair the comfort and utility of the saddle.

Fig. 11 shows the relation of the bony pelvis to a saddle of proper conformation when the rider is seated squarely upon it.

It will be at once observed that the sub-pubic region (*c*) which corresponds to the situation of the anatomical points, pressure upon which should be avoided, clears the saddle completely. There is no possibility of injurious pressure at any point, for the weight rests entirely upon the tuberosities of the ischia (*a*, *b*). Even should the rider slide backward, forward or laterally upon the saddle, no worse harm can result than loss of

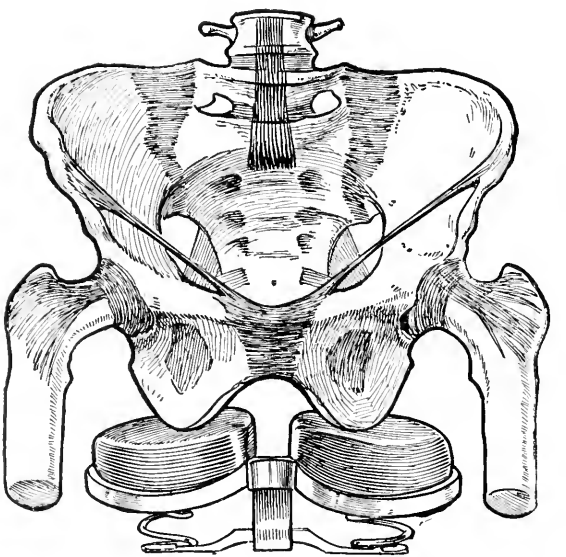


FIG. 11.

balance and possibly a fall from the wheel, which might occur with any form of saddle. No sensitive parts can possibly be brought in contact with any portion of the saddle in such a manner as to produce injurious pressure.

In the saddle shown in Figs. 13 and 14 an effort has been made to fulfil the requirements of an anatomical saddle with the result of the conformation, which is even worse than the varieties in which the lines of the ordinary horse saddle are aimed at. In this defective saddle the cushions of support are too low, and the base of the saddle is so yielding that the re-

sult is practically the same as if the saddle were upholstered in the median line, so far as pressure upon the perineum is concerned. Then, too, as this saddle yields to the pressure of the body, it curves up in such a manner that the unnecessary pommel is made still further injurious by being crowded forcibly against the perineum.

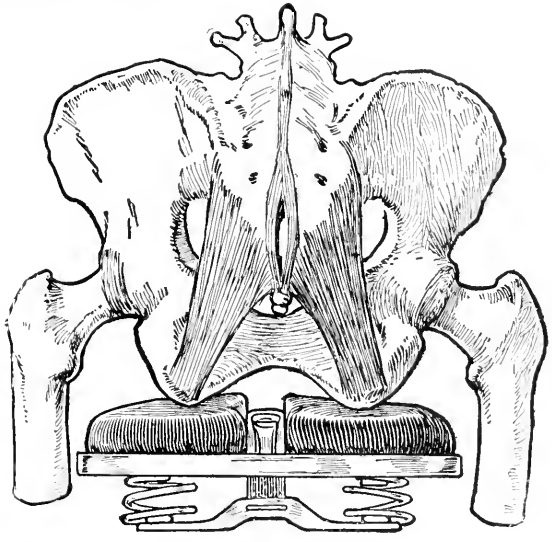


FIG. 12.

I recognize the fact that when first used, a saddle that is rational from an anatomical standpoint, is by no means as comfortable, especially to beginners, as the ordinary varieties. The pressure is concentrated, as it should properly be, upon the soft tissues covering the tuberosities of the ischiæ and is necessarily relatively greater than if the weight were more evenly distributed upon the saddle, as it is in the defective varieties that I have described. When the rider becomes used to the anatomical saddle, however, it is quite as comfortable as any of the other forms, and during the time he or she is becoming accustomed to riding it, no injury has resulted, the temporary discomfort being of no moment. After a few weeks or months' riding, however, the defective saddle, which was at first quite comfortable, will have developed in many instances, pathological

diseased conditions of the organs in relation to the perineum. The rider may be even at no time aware of injurious pressure, or even the slightest discomfort, and yet inflammation of the delicate organs upon which the faulty saddle is pressed has developed. With a defective saddle there may be temporary comfort, but there is the plus element of danger; whereas, with

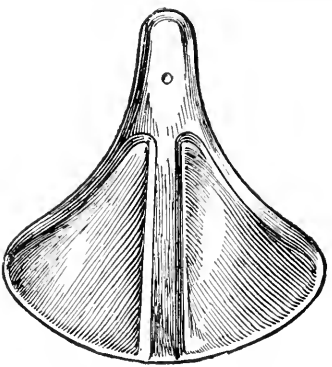


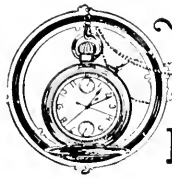
FIG. 13.

a saddle of proper construction from an anatomical standpoint, the element of danger does not exist, although there may be temporarily some slight discomfort experienced while becoming habituated to its use.

I believe that a careful study of the various forms of saddles will lead the practical surgeon to agree with me in the foregoing conclusions. Of this much I am certain: the question of bicycle riding is a very important one to the medical man,

FIG. 14.

perhaps more so than any form of outdoor exercise or physical training that has ever been devised, and if my premises be correct as regards the importance of the conformation of the bicycle saddle in relation to the development of pathological conditions, which experience has proven to occur from bicycle riding, the foregoing discussion is certainly of practical importance and worthy of serious consideration not only by the physician, but by the general public as well.



ON THE TRACK

BICYCLE RECORDS

Compiled by CHAS. W. MEARS.

WORLD'S RECORDS.

IN COMPETITION.

Distance.	Time.	Riders.	Track and Date.
*¼ miles....	.28 3-5....	A. I. Brown.....	Decatur, Ill., Oct. 13, 1894
¼ "	.29 3-5....	Tom Cooper.....	Rochester, N. Y., June 10, 1896
⅓ "	.38 1-5....	W. C. Sanger....	Chicago, Ill., July 11, 1896
½ "	.58 1-5....	Tom Cooper.....	Chicago, Ill., July 3, 1896
⅔ "	1.18 2-5....	James Michael..	New York, Sept. 25, 1897
¾ "	1.25	" ..	" "
1 "	1.49	" ..	Buffalo, N. Y., July 3, 1897
2 "	3.37 3-5....	" ..	" "
3 "	5.28	" ..	New York, Sept. 25, 1897
4 "	7.16 4-5....	" ..	" "
5 "	9.05 3-5....	" ..	Boston, Mass., Sept. 18, 1897
10 "	18.08 1-5....	" ..	" "
15 "	27.14 1-5....	" ..	" "
20 "	36.41 1-5....	" ..	" "
25 "	45.58 4-5....	" ..	" "
50 "	1.44.49 2-5....	J. W. Stocks....	Glasgow, July 31, 1897
100 "	3.30.48 1-5....	C. Huret.....	Paris, Aug. 14-15, 1897
200 "	7.36.18	"	" "
300 "	11.32.15	"	" "
400 "	15.58.18 1-5....	"	" "
500 "	20.54.15 1-5....	"	" "

* Class B record. All others professional records.

HOUR RECORDS.

Hrs.	Miles.	Yards.	Riders.	Track and Date.
1....	31....	1363 2-3....	James Michael.....	New York, Sept. 25, 1897
24....	564....	1510	C. Huret.....	Paris, Aug. 14-15, 1897

AGAINST TIME.

Distance.	Time.	Riders.	Track and Date.
¼ miles....	.29 2-5....	J. S. Johnson....	Nashville, Tenn., Oct. 28, 1896
½ "	.37 1-5....	"	" Oct. 29, 1896
½ "	.41 1-5....	"	" "
⅝ "	.58 3-5....	W. W. Hamilton.	Coronado, Cal., March 2, 1896
¾ "	1.10 1-5....	J. S. Johnson....	New Orleans, La., Nov. 12, 1896
1 "	1.35 2-5....	E. A. McDuffie..	Philadelphia, Pa., Oct. 28, 1897

Against Time—Continued.

Distance.	Time.	Riders.	Track und Date.
1 miles....	1.35 2-5.	J. W. Stocks.....	London, Sept. 8, 1897
2 "	3.27	E. A. McDuffie..	Philadelphia, Pa., Oct. 27, 1897
3 "	5.13 1-5....	J. Platt-Betts....	London, Aug. 12, 1897
4 "	7.02 2-5....	"	" "
5 "	8.50 4-5....	J. W. Stocks....	London, Sept. 11, 1897
10 "	17.47 1-5....	"	" Sept. 27, 1897
15 "	26.54 1-5....	"	" "
20 "	36.05 1-5....	"	" "
25 "	45.19 2-5....	"	" "
50 "	1.36.23 2-5....	M. Bouhours....	Paris, Sept. 30, 1897
100 "	3.25.21 4-5....	R. Palmer.....	London, Oct. 14, 1897
200 "	7.20.27	M. Cordang.....	London, Sept. 15-16, 1897
300 "	11.20.25 3-5....	"	" "
400 "	15.18.47	"	" "
500 "	19.17.28 1-5....	"	" "
600 "	23.26.34 1-5....	"	" "

HOUR RECORDS.

Hrs. Miles.	Yards.	Riders.	Track and Date.
1.... 32....	1086.....	J. W. Stocks.....	London, Sept. 27, 1897
24....616....	340.....	M. Cordang.....	London, Sept. 15-16, 1897

UNPACED MILE RECORD.

1 mile.....1.59 1-5....C. R. Coulter.....Denver, Col., Oct. 2, 1896

AMERICAN RECORDS.

PROFESSIONAL.

IN COMPETITION.

Distance.	Time.	Riders.	Track and Date.
*¼ miles....	.28 3-5....	A. I. Brown.....	Decatur, Ill., Oct. 13, 1894
¼ "	.29 3-5....	Tom Cooper.....	Rochester, N. Y., June 10, 1896
⅜ "	.38 1-5....	W. C. Sanger.....	Chicago, Ill., July 11, 1896
½ "	.58 4-5....	Tom Cooper.....	Chicago, Ill., July 3, 1896
⅔ " ...	1.18 2-5....	James Michael...	New York, Sept. 25, 1897
¾ "	1.25	" ...	" "
1 "	1.49	" ...	Buffalo, N. Y., July 3, 1897
2 "	3.37 3-5....	" ...	" "
3 "	5.28	" ...	New York, Sept. 25, 1897
4 "	7.16 4-5....	" ...	" "
5 "	9.05 3-5....	" ...	Boston, Mass., Sept. 18, 1897
6 "	10.50 4-5....	" ...	" "
7 "	12 42 2-5....	" ...	" "
8 "	14.32 1-5....	" ...	" "
9 "	16.19 2-5....	" ...	" "
10 "	18.08 1-5....	" ...	" "
11 "	19.56 2-5....	" ...	" "
12 "	21.46 3-5....	" ...	" "

* Class B record. All others professional records.

In Competition—Continued.

Distance.	Time.	Riders.	Track and Date.
13 miles....	23.35	James Michael...	Boston, Mass., Sept. 18, 1897
14 "	25.27 1-5....	" ...	" "
15 "	27.14 1-5....	" ...	" "
16 "	29.05 3-5....	" ...	" "
17 "	31.01 2-5....	" ...	" "
18 "	32.53 3-5....	" ...	" "
19 "	34.48	" ...	" "
20 "	36.41 1-5....	" ...	" "
21 "	38.30 3-5....	" ...	" "
22 "	40.25 4-5....	" ...	" "
23 "	42.14	" ...	" "
24 "	41.08 3-5....	" ...	" "
25 "	45.58 4-5....	" ...	" "
26 "	48.56 2-5....	" ...	New York, Sept. 25, 1897
27 "	50.51	" ...	" "
28 "	52.43	" ...	" "
29 "	54.38 2-5....	" ...	" "
30 "	56.33	" ...	" "
31 "	58.30 4-5....	" ...	" "
32 " ....1.00.25 3-5....		" ...	" "
33 " ....1.02.17 4-5....		" ...	" "
35 " ....1.30.39 1-5....	Frank Waller....	Boston, Mass., Aug. 16, 1897	
40 " ....1.44.09 1-5....	"	" "	
45 " ....1.57.40 3-5....	Frank Albert.....	" "	
50 " ....2.11.00 3-5....	Frank Waller....	" "	
55 " 2.24.54	"	" "	
60 " ....2.38.46 3-5....	"	" "	
65 " 2.53.42	T. A. Barnaby...	" "	
70 " ....3.07.15 2-5....	Frank Albert.....	" "	
75 " ....3.21.14 4-5....	Frank Waller....	" "	
80 " ....3.25.13 2-5....	"	" "	
85 " 3.48.45	"	" "	
90 " 4.03.22	"	" "	
95 " 4.18.48	"	" "	
100 " 4 33.52	T. A. Barnaby...	" "	
125 " 5.50.33	Frank Waller....	" "	
150 " ....7.10.36 4-5....	"	" "	
165 " ....7.57.34 1-5....	"	" "	

HOUR RECORD.

Hr.	Miles.	Yards.	Rider.	Track and Date.
1.....	31....	1363 2-3....	James Michael.....	New York, Sept. 25, 1897

INDOOR COMPETITION.

Distance.	Time.	Riders.	Track and Date.
1 miles....	1.57 4-5....	Tom Cooper...	Atlanta, Ga., Nov. 16, 1897
2 "	4.02 2-5....	Jas. Michael..	Chicago, Ill., Nov. 13, 1897
3 "	6.01 1-5....	" ..	" "
4 "	8.05 3-5....	" ..	" "
5 "	10.03 3-5....	" ..	" "
6 "	12.07	" ..	New York, Nov. 25, 1897
7 "	14.09 1-5....	" ..	" "
8 "	16.10 2-5....	" ..	" "
9 "	18.07 1-5....	" ..	" "
10 "	20.08 2-5....	" ..	" "
11 "	22.07 1-5....	" ..	" "

Indoor Competition—Continued.

Distance.	Time.	Riders.	Track and Date.
12 miles....	21.08 1-5....	Jas. Michael..	New York, Nov. 25, 1897
13 "	26.10 2-5....	" ..	" "
14 "	28.13	" ..	" "
15 "	30.12 1-5....	" ..	" "
16 "	32.12 2-5....	" ..	" "
17 "	34.18	" ..	" "
18 "	36.21 2-5....	" ..	" "
19 "	38.23	" ..	" "
20 "	40.25 2-5....	" ..	" "
21 "	42.26 3-5....	" ..	" "
22 "	44.25 1-5....	" ..	" "
23 "	46.28 3-5....	" ..	" "
24 "	48.30 1-5....	" ..	" "
25 "	50.29 1-5....	" ..	" "
30 "	1.06.14	C. W. Miller..	Chicago, Ill., Sept. 24-25, 1896
50 "	1.54.25 3-5....	" ..	" "
100 "	4.07.01 ...	" ..	" "
200 "	8.49 30	Louis Gimm..	Chicago, Ill., Sept. 24-25, 1896
500 "	30.20.00	Edward Hale..	New York, Dec. 7-12, 1896
1000 "	.....	Albert Shoch..	Washington, Mar.29-Apr.3,1897
1500 "	108.13.00	Edward Hale..	New York, Dec. 7-12, 1896
1900 "	140.43.00	" ..	" "

FLYING START—PACED.

¼ miles....	.20 2-5 ...	J. S. Johnson....	Nashville, Tenn ,	Oct. 28, 1896
⅓ "	.27 1-5....	"	"	Oct. 29, 1896
½ " ...	.44 1-5....	"	"	"
⅔ "	.58 3-5....	W. W. Hamilton.	Coronado, Cal.,	March 2, 1896
¾ "	1.10 1-5....	J. S. Johnson....	New Orleans, La.,	Nov. 12, 1897
1 "	1.35 2-5 ...	E. A. McDuffie..	Philadelphia, Pa.,	Oct. 28, 1897
2 "	3.27	" ...	"	Oct. 29, 1897
3 "	5.19 1-5....	James Michael...	Philadelphia, Pa.,	Aug. 9, 1897
4 "	7.07 1-5....	" ...	"	"
5 "	8.54	" ...	"	"
6 "	10.46 1-5....	" ...	"	"
7 "	12.38 1-5....	" ...	"	"
8 "	14.28 1-5....	" ...	"	"
9 " ...	16.18	" ...	"	"
10 "	18 09 3-5....	" ...	"	"
15 "	27.26 1-5....	" ...	"	"
20 "	36.44 2-5....	" ...	"	"
25 "	46.05 1-5....	" ...	"	"
30 "	55.33	" ...	"	"
35 " 1.19.55	....	Frank Waller....	Memphis, Tenn.,	Nov. 19, 1896
40 " 1.31.08	....	"	"	"
45 " 1.42.12	....	" . ..	"	"
50 " 1.53.18	....	"	"	"
75 " 2.51.20	....	"	"	"
100 " 3.52.11	....	"	"	"
106 " 4.12.04	....	"	"	"

HOUR RECORD.

Hr.	Miles.	Yards.	Rider.	Track and Date.
1....	32.....	652.....	James Michael.....	Philadelphia, Pa., Oct. 9, 1897

FLYING START—UNPACED.

Distance.	Time.	Riders.	Track and Date.
¼ miles....	.26 1-5....	Arthur Gardiner.	Denver, Col., Dec. 4, 1896
⅓ "	.32 2-5....	W. W. Hamilton.	Coronado, Cal., March 2, 1896
½ "	.57	Arthur Gardiner.	Detroit, Mich., July 21, 1897
⅔ "	1.14 1-5 ...	W. C. Sanger.....	Denver, Col., Nov. 16, 1895
¾ "	1.24 4-5....	A. B. Hughes....	Denver, Col., July 31, 1897
1 "	1.59 1-5....	C. R. Coulter....	Denver, Col., Oct. 2, 1896
2 "	4.27	Henry Bradis....	Memphis, Tenn., Nov. 12, 1896
3 "	6.46 4-5....	A. B. Hughes....	Denver, Col., Aug. 21, 1897
4 "	9.17	Henry Bradis.....	Memphis, Tenn., Nov. 21, 1896
5 "	11.42	"	" "
6 "	14.25	A. F. Senn.....	Louisville, Ky., Nov. 18, 1895
7 "	16.50	"	" "
8 "	19.15 2-5....	"	" "
10 "	24.10	"	" "
15 "	36.36 1-5....	"	" "
20 "	49.20	"	" "
25 "	1.02.37 2-5....	"	" "
50 "	2.16.03 ...	John Lawson.....	Memphis, Tenn., Nov 17, 1896
75 "	3.39.03 2-5....	C. W. Miller.....	Chicago, Ill., Oct. 2, 1897
100 "	4.59.27 4-5....	"	" "

HOUR RECORDS.

Hrs.	Miles.	Yards.	Riders.	Track and Date.
1....	21.....	65.....	A. F Senn.....	Louisville, Ky., Nov. 18, 1895
21....	323.....	.....	S. G. Meixell.....	Denver, Col., July 30-31, 1897

STANDING START—PACED.

Distance.	Time.	Riders.	Track and Date.
¼ miles....	.30	J. S. Johnson.....	Lewisburg, Pa., June 14, 1895
⅓ "	.37 2-5....	"	Louisville, Ky., Nov. 7, 1895
⅔ "	1.15 3-5....	"	" "
¾ "	1.30	"	Waltham, Mass., July 4, 1895
1 "	1.49 3-5....	H. E. McCrea.....	Coronado, Cal., Feb. 14, 1896
5 "	10.11 1-5....	J. F. Starbuck.....	Springfield, Mass., Sept. 12, 1895

STANDING START—UNPACED.

¼ miles.... .30	J. Lee App.....	Louisville, Ky., Sept. 18, 1897
⅓ " .... .37 4-5....	F. Ed Schefski.....	Coronado, Cal., April 17, 1896
1 " 2.05	O B. Hachenberger..	Denver, Col., July 4, 1896
2 " ....4.24 2-5....	A. B. Hughes.....	Denver, Col., July 31, 1897
3 " ....7.16 1-5....	A. F. Senn.....	Louisville, Ky., Oct. 18, 1895

HOUR RECORDS IN COMPETITION.

Hrs.	Miles.	Yards.	Riders.	Track and Date.
1....	31....	1363 2-3....	James Michael...	New York, Sept. 25, 1897
2....	51....	1670	C. W. Miller.....	Chicago, Ill., Sept. 24, 1896
3....	74....	195 1-2....	Fred Schinneer...	Grand Rapids, Mich., May 31, '97
4....	97....	1073 1-3....	" ...	" "
5....	120....	586 2-3....	Louis Gimm.....	" "
6....	142....	586 2-3....	"	" "
12 ...	265....	1735	"	Chicago, Ill., Sept. 24-25, 1896
21....	486....	1151	"	" "

Hour Records in Competition—Continued.

Hrs.	Miles.	Yards.	Riders.	Track and Date.
36....	582....	528	....Albert Shoch.....	Washington, Mar. 29-Apr. 3, '97
48....	776....		.... "	" "
60....	912....	704	.... "	" "
72....	1072....		.... "	" "
84....	1210....		....Edward Hale.....	New York, Dec. 7-12, 1896
96....	1361....		.... "	" "
108....	1488....		.... "	" "
120....	1646....		.... "	" "
132....	1793....		.... "	" "
142....	1910....		.... "	" "

The records for 2 and 12 hours and all records from 11 hours up were made on indoor tracks.

TANDEM IN COMPETITION.

Distance.	Time.	Riders.	Track and Date.
1 miles....	1.46 1-5....	Nat and Frank Butler.	Boston, Mass., July 31, 1897
2 "	4.06 2-5....	" " .	" "
3 "	6.39 1-5....	Callahan-Walsh.....	Boston, Mass., June 12, 1897

TANDEM AGAINST TIME.

*1/4 miles....	.23 3-5....	Randall-Schefski...	Coronado, Cal., April 11, 1896
+1/4 "	.22 3-5....	Phillips-Wing.....	Nashville, Tenn., Oct. 30, 1896
*1/3 "	.31 2-5....	Randall-Schefski...	Coronado, Cal., April 15, 1896
+1/3 "	.31 4-5....	Staver-Winesett....	Coronado, Cal., April 11, 1896
*1/2 "	.47 3-5....	Randall-Schefski...	Coronado, Cal., April 15, 1896
+1/2 "	.51 1-5....	Phillips-Bradis.....	Nashville, Tenn., Oct. 30, 1896
*2/3 "	1.11 2-5....	Nat & Tom Butler.	Boston, Mass., July 4, 1896
+2/3 "	1.12 3-5....	Staver-Winesett....	Coronado, Cal., April 15, 1896
*3/4 "	1 20 . ..	Nat & Tom Butler.	Boston, Mass., July 4, 1896
+3/4 "	1.25 1-5....	Sager-Swanbrough.	Denver, Col., Dec. 5, 1896
*1 "	1.12 2-5....	Fowler-Church....	Philadelphia, Pa., Nov. 6, 1897
+1 "	1.51 2-5....	Swanbr'gh-Hughes.	Denver, Col., Oct. 4, 1897
*2 "	3.10 2-5....	Fowler-Church....	Philadelphia, Pa., Nov. 6, 1897
+2 "	4.04 2-5....	Evans-Hatton.....	San Jose, Cal., May 26, 1896
*3 "	5.31 1-5....	Fowler-Church....	Philadelphia, Pa., Nov. 6, 1897
+3 "	6.17 1-5....	Evans-Hatton.....	San Jose, Cal., May 26, 1896
*4 "	7.25 4-5....	Fowler-Church....	Philadelphia, Pa., Nov. 6, 1897
+1 "	8.26	Evans-Hatton.....	San Jose, Cal., May 28, 1896
*5 "	9.25 2-5....	Fowler-Church....	Philadelphia, Pa., Nov. 6, 1897
+5 "	10.37	Sager-Swanbrough.	Denver, Col., Nov. 23, 1896
*6 "	11.19	Fowler-Church....	Philadelphia, Pa., Nov. 6, 1897
+6 "	13.22 2-5....	Sager-Swanbrough.	Denver, Col., Dec. 5, 1896
*7 "	13.12 1-5....	Fowler-Church....	Philadelphia, Pa., Nov. 6, 1897
+7 "	15.36 4-5 ...	Sager-Swanbrough.	Denver, Col., Dec. 5, 1896
*8 "	15.13 1-5....	Fowler-Church....	Philadelphia, Pa., Nov. 6, 1897
+8 "	18.51 3-5....	Sager-Swanbrough.	Denver, Col., Dec. 5, 1896
*9 "	17.06 3-5....	Fowler-Church....	Philadelphia, Pa., Nov. 6, 1897
+9 "	20.06	Sager-Swanbrough.	Denver, Col., Dec. 5, 1896
*10 "	19.02 4-5....	Fowler-Church....	Philadelphia, Pa., Nov. 6, 1897
+10 "	22.16 2-5....	Sager-Swanbrough.	Denver, Col., Dec. 5, 1896
+11 "	25.32 4-5....	McCall-Sager.....	Omaha, Neb., Nov. 16, 1897
+12 "	28.00	"	" "
+13 "	30.27 3-5....	"	" "

* Flying start, paced. + Flying start, unpaced.

Tandem Against Time—Continued.

Distance.	Time.	Riders.	Track and Date.
*14 miles....	33.19 3-5....	McCall-Sager.....	Omaha, Neb., Nov. 16, 1897
*15 "	....35.21	"	" "
*16 "	....37.17 1-5....	"	" "
*17 "	....40.15	"	" "
*18 "	....42.39	"	" "
*19 "	....45.05 4-5....	"	" "
*20 "	....47.34 1-5....	"	" "
*21 "	....50.03 2-5....	"	" "
*22 "	....52.30 1-5....	"	" "
*23 "	....54.57 1-5....	"	" "
*24 "	....57.26 2-5....	"	" "
*25 "	....59.50 2-5....	"	" "

TRIPLET AGAINST TIME.

*¼ miles....	.25 3-5..	Phillips, Bradis and Myers.....	New Orleans, La., Nov. 6, 1896
*½ "	.48 2-5..	"	Nashville, Tenn., Oct. 29, 1896
*¾ "	.... 1.19 2-5..	"	New Orleans, La., Nov. 6, 1896
*1 "	.... 1.41 ..	McDuffie, Church & Fowler.....	Philadelphia, Pa., Oct. 26, 1897
*2 "	.... 3.38 3-5..	Church, Jack and Vernier.....	Philadelphia, Pa., Nov. 3, 1897
*3 "	.... 5.30 ..	"	" "
*4 "	.... 7.22 2-5..	"	" "
*5 "	.... 9.16 3-5..	"	" "
*6 "	....11.14 ..	"	" "
*7 "	... 13.11 1-5..	"	" "
*8 "	....15.07 3-5..	"	" "
*9 "	....17.01 3-5..	"	" "
10* "	... 18.52 ..	"	" "

TRIPLET IN COMPETITION.

1 miles....	1.46 ..	Michael, Stons and Bainbridge.....	Boston, Mass., July 31, 1897
5 "	....10.04 2-5..	Johnson, Steensen and Becker.....	Philadelphia, Pa., Sept. 18, '97

QUADRUPLET AGAINST TIME.

*¼....	.23 .	Weinig, Davis, Steensen and Phillips.....	Nashville, Tenn., Oct. 30, 1896
*½....	.31 1-5.	Waller, Myers, Bradis and Staver.....	" Oct. 29, 1896
*½....	.49 3-5.	Phillips, Bradis, Irons and Miller.....	Chicago, Ill., Oct. 12, 1897
*1....	1.40 2-5.	Phillips, Van Herik, Bradis and Bainbridge.....	" Oct. 2, 1897
*2....	3.36 3-5.	Phillips, Boone, Turville and McCurdy.....	Philadelphia, Pa., Nov. 3, 1897
*3 ...	5.29 2-5.	"	" "
*4 ...	7.23 2-5.	"	" "
*5....	9 18 2-5.	"	" "
*6...	11.13 3-5.	"	" "
*7....	13.09 2-5.	"	" "
*8 ...	15.02 1-5.	"	" "
*9....	16.59 .	"	" "
*10....	18.49 4-5.	"	" "

* Flying start, paced. + Flying start, unpaced.

QUADRUPLET IN COMPETITION.

Miles.	Time.	Riders.	Track and Date.
1....	1.50 1-5..	Waller, Leonart, Pierce and Sharer.....	Boston, Mass., July 31, 1897

QUINTUPLET AGAINST TIME.

†1....	1.46 2-5.	Callahan, N. Butler, Pierce, Walsh and Coleman.....	Boston, Mass., Aug. 1, 1896

† Flying start, unpaced.

QUINTUPLET IN COMPETITION.

1....	1.47	Callahan, Walsh, Haggerty, Reynolds and Bowden....	Boston, Mass., July 31, 1897

SEXTUPLET AGAINST TIME.

1....	1.49	Hammond, Tarment, McLean, McLean, Stafford and Grennan.....	Philadelphia, Pa.,	Oct. 29, 1897
2....	3.40 3-5.	"	"	"
3....	5.33 2-5.	"	"	"
4....	7.30	"	"	"
5....	9.27 3-5.	"	"	"
6....	11.27 2-5.	"	"	"
7....	13.22 3-5.	"	"	"

SEXTUPLET IN COMPETITION.

1....	1.45 4-5.	McDuffee, Caldwell, Sullivan, Mayo, Barnaby and Saunders.....	Boston, Mass., July 31, 1897

AMATEUR.

IN COMPETITION.

Distance.		Time	Riders.	Track and Date.
*¼	miles....	.26 4-5....	F. J. Loughead....	Springfield, Mass., Sept. 12, 1895
¼	"	.27 1-4....	A. B. Howie.....	Janesville, Wis., Oct. 10, 1894
½	"	.40 3-5....	P. J. Bornwasser..	Louisville, Ky., Sept. 4, 1897
½	"	1.00 1-5....	E. W. Peabody....	Kalamazoo, Mich., Oct. 4, 1897
½	"	1.00 1-5....	H. Middendorf....	Louisville, Ky., Oct. 23, 1897
¾	"	1.24	A. A. Kaliska.....	Warren, Pa., July 13, 1897
¾	"	1.35 1-5....	W. S. Reynolds....	Springfield, Mass., Sept 11, 1895
1	"	1.59	W. Robertson.....	Denver, Col., Oct. 2, 1897
‡1	"	2.00 2-5....	F. F. Desmond....	Denver, Col., Aug. 8, 1896
2	"	4.06 1-5....	O. W. Smith.....	Waltham, Mass., June 17, 1897
3	"	6.22 3-5....	F. H. Wilson.....	Chicago, Ill., Sept. 22, 1896
4	"	8.34 3-5....	"	" "
5	"	10.33 3-5....	E. C. Hausman....	Springfield, Mass., Sept. 16, 1897

* Flying start. † Standing start. ‡ Record for novice.

In Competition—Continued.

Distance.	Time.	Riders.	Track and Date.
6 miles....	12.58 2-5....	F. H. Wilson.....	Chicago, Ill., Sept. 22, 1896
7 "	15.07 2-5....	"	" "
8 "	17.24 3-5....	"	" "
9 "	19.34 4-5....	"	" "
10 "	21.47 3-5....	"	" "
15 "	32.40 1-5....	"	" "
20 "	43.47	"	" "
25 "	54.35	"	" "
30 " ....1.12.34 1-5....	A. A. Hansen.....	Minneapolis, Minn., Aug. 15,'95	
40 " ....1.37.34 2-5....	"	" "	
50 " ....2.06.30 1-5....	"	" "	
60 " 2.39.01	"	" "	

FLYING START—PACED.

¼ miles....	.24 ....E. A. Moross.....	Detroit, Mich., Nov. 10, 1897	
⅓ "	.31 1-5....	"	" Nov. 8, 1897
½ "	.50 2-5....	"	" "
⅔ "	1.09 3-5....H. M. Sidwell....	Cincinnati, O., Oct. 7, 1897	
¾ "	1.18	"	" Oct. 5, 1897
1 "	1.43 2-5....H. G. Gardiner...	Philadelphia, Pa., Sept. 11, 1897	
2 "	3.44 1-5....C. J. Miller.....	Buffalo, N. Y., Oct. 22, 1897	
3 "	5.53 1-5....Ray Duer.....	" Oct. 23, 1897	
4 "	7.52	"	" "
5 "	9.54 1-5....C. V. Dasey.....	Denver, Col., Oct. 2, 1897	
6 "	12 05 ....Ray Duer.....	Buffalo, N. Y., Oct. 2, 1897	
7 "	14.06 2-5....	"	" "
8 "	16.13 2-5....	"	" "
9 "	18.14	"	" "
10 "	20.19 2-5....	"	" "
15 "	30.47 3-5....	"	" "
20 "	41.24 3-5....	"	" "
25 "	51.57 1-5....	"	" "
28 "	58.11 2-5....	"	" "
30 " ....1.13.32 ....A. C. Banker....	Chicago, Ill., Sept. 1, 1897		
40 " ....1.37.54 1-5....	"	" "	
50 " ....2.02.28 2-5....	"	" "	
60 " ....2.30.02 ....James C. Miller..	Cleveland, O., Aug. 28, 1897.		
70 " 2.55.12	" ..	" "	
80 " 3.21.25	" ..	" "	
90 " 3.50.20	" ..	" "	
100 " 4.23.08	" ..	" "	
102 " 4.29.25	" ..	" "	

FLYING START—UNPACED.

¼ miles....	.25 1-5....A. B. Simons....	Deming, N. M., May 26, 1896	
⅓ "	.33 3-5....	"	" "
½ "	.55 1-5....W. J. Evans.....	Coronado, Cal., April 13, 1896	
⅔ "	1.21 1-5....H. C. Clark.....	Denver, Col., Oct. 17, 1895	
¾ "	1.24 1-5....Jos. Heil.....	Denver, Col., July 31, 1897	
1 "	1.37 ....F. B. Stowe.....	Springfield, Mass., Oct. 20, 1894	
1 "	2.04 1-5....A. B. Hughes....	Denver, Col., May 27, 1896	
2 "	4.27 3-5....W. F. Sager.....	" Oct. 3, 1896	
2 "	4 27 3-5....Jos. Heil.....	" Aug. 21, 1897	
3 "	7.03 ....O.B.Hach'nb'g'r.	" Dec. 13, 1895	
1 "	9.31 2-5....	" .	" "
5 "	11.56 1-5....	" .	" "

Flying Start—Unpaced—Continued.

Distance.	Time.	Riders.	Track and Date.
10 miles....	24.19 2-5....	A. G. Kluefer...	Racine, Wis., July 2, 1897
15 "	38.25	A. L. Hach'nb'g'r.	Denver, Col., Nov. 16, 1896
20 "	52.07	A. J. Thibodeen.	Chicago, Ill., Oct. 29, 1897
25 "	1.03.45	" .	" "
30 "	1.16.45	" .	" "
40 "	1.44.42 2-5....	" .	" "
50 "	2.14.05	" .	" "
75 "	3.53.33 1-5....	R. Lauricks.....	Boston, Mass., July 31, 1897
100 "	5.16.24 2-5....	"	" "
125 "	8.08.19	"	" May 29-30, 1897
150 "	9.52.45	"	" "
175 "	11.46.50	"	" "

STANDING START—PACED.

¼ miles....	.28	J. S. Johnson....	Independence, Ia., Oct. 31, 1893
½ "	.32	F. L. Eberhardt.	Salina, Kan., Nov. 15, 1895
¾ "	.59	A. W. Porter....	Waltham, Mass., Oct. 20, 1894
⅞ "	1.18 2-5....	"	" Nov. 2, 1894
⅞ "	1.28 3-5....	"	" "
1 "	1.51 3-5....	P. J. Becker.....	Denver, Col., Oct. 19, 1895
2 "	4.07 2-5....	Nat Butler.....	Waltham, Mass., Nov. 10, 1894
3 "	6.36	J. H. Gardner...	Springfield, Mass., Nov. 12, 1895
4 "	8.51	"	" "
5 "	10.07 2-5....	C. W. Miller....	Louisville, Ky., Nov. 7, 1895
10 "	23.04 3-5....	L. S. Meintjes...	Springfield, Mass., Sept. 14, 1893
15 "	34.37	" ...	" "
20 "	46.07	" ...	" "
25 "	57.40 3-5....	" ...	" "
30 "	1.19.41 4-5....	A. G. Harding..	St. Louis, Mo., Oct. 21, 1894
40 "	1.46.27	" ..	" "
50 "	2.12.45 3-5....	" ..	" "
75 "	3.21.37 4-5....	" ..	" "
100 "	4.37.56 4-5....	" ..	" "
125 "	6.09.01 ...	Louis Gimm.....	Cleveland, O., Aug. 14-15, 1895
150 "	7.23.12	"	" "
200 "	9.49.40	"	" "
300 "	14.38.41	"	" "
400 "	20.17.30	"	" "
452* "	24.00.00	"	" "

* Complete distance for 24 hours, 452 miles 1715 yards.

STANDING START—UNPACED.

¼ miles....	.27 2-5....	Upson.....	Sacramento, Cal., Oct. 17, 1894
½ "	.41 2-5....	H. Middendorf....	Louisville, Ky., Sept. 6, 1897
¾ "	1.01 1-5....	Peter Metcalf.....	Chico, Cal., Aug. 29, 1895
⅞ "	1.21 1-5....	H. C. Clark.....	Denver, Col., Oct. 17, 1895
⅞ "	1.37 1-5....	J. D. Park.....	Denver, Col., Nov. 5, 1894
1 "	2.14 4-5....	Nils Carlson.....	Cleveland, O., Sept. 25, 1897
2 "	4.46 1-5....	H. C. Clark.....	Denver, Col., Oct. 4, 1895
3 "	7.15	"	" Nov. 21, 1895
4 "	9.47	"	" "
5 "	12.12	"	" "
6 "	16.16	R. Lauricks.....	Boston, Mass., June 26, 1897
7 "	19.03 2-5....	"	" "
8 "	21.47 1-5....	"	" "

Standing Start—Unpaced—Continued.

Distance.	Time.	Riders.	Track and Date.
9 miles....	24.28 2-5....	R. Lauricks.....	Boston, Mass., June 26, 1897
10 "	27.10 4-5....	"	" "
15 "	40.55 3-5....	"	" "
20 "	54 42 2-5....	"	" "
25 " ....1.08.47 1-5....		"	" "
30 " 1.23.05		"	" "
40 " ....1.52.40 4-5....		"	" "
50 " ....2.23.25 3-5....		"	" "

HOUR RECORDS AGAINST TIME.

Hrs.	Miles.	Yards.	Riders.	Track and Date.
1....	28....	1585...	Ray Diner.....	Buffalo, N. Y., Oct. 19, 1897
2....	45....	1530....	L. S. Meintjes.....	Springfield, Mass., Sept. 14, 1893
3....	66....	1680....	A. G. Harding	St. Louis, Mo., Oct. 24, 1894
4....	86....	1320....	"	" "
5....	101....	440....	Louis Gimm.....	Cleveland, O., Aug. 14-15, 1895
6....	121....	1100....	"	" "
12....	238....	1320....	"	" "
18....	356....	1100....	"	" "
24....	452....	1715....	"	" "

TANDEM IN COMPETITION.

Distance.	Time.	Riders.	Track and Date.
¼ miles....	.35	....Davisworth-Mitchell..	Louisville, Ky., July 1, 1896
½ "	.56	.... " ..	" "
¾ "	1.17	.... " ..	" "
1 "	1.55 3-5....	Hausman-Collett.....	Waterbury, Conn., Sept. 9, 1897
2 "	4.13 2-5....	Fowler-Reagan.....	Boston, Mass., July 5, 1897

TANDEM AGAINST TIME.

*¼	miles....	.25 4-5....	Haggerty-Williams..	Waltham, Mass., Nov. 2, 1894
*½	"	.24 4-5....	Rodgers-Fairies.....	Decatur, Ill., Oct. 27, 1896
*½	"	.24 4-5....	Casey-Eckberg.....	Springfield, Mass., Sept. 16, 1897
*¾	"	.31 2-5....	Haggerty-Williams..	Waltham, Mass., Nov. 2, 1894
*¾	"	.31 4-5 ..	M'R'yn'ds-Car'th'rs.	Denver, Col., July 2, 1897
*1	"	.53 1-5....	Haggerty-Williams..	Waltham, Mass., Nov. 2, 1894
*1	"	.51 3-5....	Casey-Eckberg.....	Springfield, Mass., Sept. 16, 1897
*1	"	1.03 3-4....	Gillespie-Woods.....	Rockland, N. Y., Sept. 2, 1895
*1	"	1.13 3-5....	Haggerty-Williams..	Waltham, Mass., Oct. 27, 1894
*1	"	1 17	Watts-Smith.....	Denver, Col., Oct. 23, 1896
*1	"	1 25	Haggerty-Williams..	Waltham, Mass., Oct. 27, 1894
*1	"	1.52 3-5....	" ..	" "
*1	"	1.51	Hood-Carlson.....	Detroit, Mich., Oct. 2, 1897
*2	"	1.12 3-5....	Watts-Smith.....	Denver, Col., Nov. 23, 1896
3	"	6.21 2-5....	Dasey-Goramflo.....	Denver, Col., July 16, 1897
4	"	8.36 1-5....	"	" "
5	" ....10.16 4-5....		"	" "

* Flying start, paced. + Flying start, unpaced. ‡ Standing start, paced,

TRIPLET AGAINST TIME.

Distance.	Time.	Riders.	Track and Date.
*¼ miles....	.23 ..	Callahan, Murphy and Kennedy...	Chillicothe, O., Nov. 5, 1894
⅓ "	.37 2-5..	Vesper, Bren and Hunt.....	Salina, Kan., Aug. 21, 1896
½ "	.53 ..	Nicholson, Reid & Hedges.....	Columbus, O., Sept. 11, 1897
*⅔ "	1.20 1-5..	Murphy, Kennedy and Saunders....	Louisville, Ky., Nov. 23, 1894
*¾ "	1.31 ..	"	" "
1 "	1.52 2-5..	Rittnauer, App and McCabe.....	Louisville, Ky., Aug. 13, 1896
2 "	4.17 1-5..	Pierre, O'Neill and Gracey	Philadelphia, Pa., Aug. 27, '96
3 "	6.29 ..	"	" "
4 "	8.43 ..	"	" "
5 "	10.57 1-5..	"	" "
10 "	22.13 1-5..	"	" "
15 "	33.32 2-5..	"	" "
20 "	44.50 1-5..	"	" "
25 "	56.02 3-5..	"	" "
26 "	58.15 2-5..	"	" "

HOUR RECORD.

Hr.	Miles.	Yards.	Riders.	Track and Date.
1....	26....	1373....	Pierre, O'Neill & Gracey.	Philadelphia, Pa., Aug. 27, '96

QUADRUPLET AGAINST TIME.

Miles.	Time.	Riders.	Track and Date.
*¼....	.23 .	Callahan, Seavey, O'Connor and Rhodes	Chillicothe, O., Nov. 5, 1894
*⅓....	.34 3-5.	O'Connor, Hamilton, Coburn and Terrill.....	Louisville, Ky., May 25, 1895
*½....	.51 .	Stone, Swanbrough, Dickson and Connibear.....	Denver, Col., Oct. 17, 1895
*⅔....	1.15 .	O'Connor, Seavey, Steensen and Rhodes.....	Louisville, Ky., May 25, 1895
*¾....	1.21 .	"	" "
*1....	1.47 1-5.	Stone, Swanbrough, Dickson and Connibear.....	Denver, Col., Oct. 17, 1895

* Class B records.

ROAD RECORDS—NATIONAL.

ONE MILE STRAIGHTAWAY.

	Time.	Rider.	Track and Date.
F. S., paced....	1.55 1-5....	A. Ferguson.....	Terre Haute, June 2, 1897
F. S., unpaced..	2.11 4-5....	H. H. Dr'nb'rg'r.	" "
S. S., paced.....	2.12 1-5....	Charles Franklin.	" "
S. S., unpaced..	2.16 4-5....	C. A. Foster.....	" "

TANDEM—ONE MILE STRAIGHTAWAY.

	Time.	Riders.	Track and Date.
F. S., unpaced	1 55	Hulman-Ferguson	Terre Haute, June 2, 1897

STRAIGHTAWAY.

Distance.	Time.	Riders.	Track and Date.
5 miles	9.24	T. O. Vaux	Colorado Springs, Oct. 28, 1896
10 "	21.25	A. B. McDonell	Buffalo, May 26, 1896
15 "	34 32	"	"
20 "	46.01	"	"
25 "	51.55	"	" Oct. 19, 1895
50 "	2.15.00	L. C. Wahl	Colorado Springs, May 10, 1895
75 "	None.		
100 "	4.10.09	A. B. McDonell	Buffalo, Oct. 28, 1895
200 "	None.		
300 "	None.		
400 "	None.		
500 "	56.05.00	A. E. Smith	Chicago, June 28-July 1, 1896
1000 "	144.05.00	R. P. Searle	Chicago, Oct. 17-23, 1894

STANDARD COURSE.

5 miles	11.31 4-5	A. G. Relyea	Brooklyn, Oct. 31, 1896	
10 "	24.14	I. N. Walleston	Newburyport, Oct. 1, 1895	
15 "	36.24	"	"	"
20 "	48.58	"	"	"
25 "	1.00.59	"	"	"
50 "	2.30.40	A. L. Weinig	Buffalo, Sept. 15, 1894	
75 "	4.17.12 1-2	Henry Smith	Baltimore, May 23, 1897	
100 "	5.22.30	P. C. Wright	Colorado Springs, Aug. 9, 1896	
200 "	12.30.00	A. W. W. Evans	New Brunswick, Aug. 19, 1895	
300 "	22.56.08	Henry Smith	Baltimore, May 9-10, 1897	
400 "	None.			
500 "	None.			
1000 "	113.45.00	J. F. Gunther	Chicago, Oct. 6-11, 1894	
12 hours, 170 miles		Henry Smith	Baltimore, May 9, 1897	
24 hours, 316 miles		Elmer C. Davis	Baltimore, July 10-11, 1897	

TANDEM.

STRAIGHTAWAY.

5 miles	10.22 4-5	Dixon-Kraft	San Francisco, Sept. 26, 1896					
10 "	23.25	Wright-Fairley	Colorado Springs, June 20, 1897					
15 "	36.42	"	"	"	"	"	"	
20 "	50.17	"	"	"	"	"	"	
25 "	1.03.10	"	"	"	"	"	"	
75 "	3.45.00	"	"	"	"	"	"	

STANDARD COURSE.

10 miles	27.05 3-5	Winton-Baird	Cleveland, Oct. 19, 1894					
15 "	37.02	Knuth-Roth	State Line, N. Y., Aug. 25, 1895					
25 "	1 10.00	Wills-Cochran	St. Louis, July 14, 1895					
50 "	2.21.10	Wright-Fairley	Colorado Springs, June 20, 1897					
100 "	5 14 38	"	"	"	"	"	"	

STATE RECORDS.

STRAIGHTAWAY

FIVE MILES.

Time.	Riders.	Track and Date.
9.24	T. O. Vaux	Colorado Springs, Col, Oct. 28, '96
11.11 2-5	Geo. Hamlin	San Francisco, Cal., Nov. 17, '95
11.18 1-5	W. A. Parker	Waco, Tex., Nov. 29, 1894
11.42	Linus Schillinger	Syracuse, N. Y., Aug. 7, 1896
11.50	E. Kostomlatsky	Oskaloosa, Iowa, Oct. 27, 1895
12.15	W. A. Wenzel	Philadelphia, Pa., July 7, 1894
13.21 3-4	Henry Smith	Baltimore, Md., May 23, 1897
15.37	W. H. Ingham	Salt Lake City, Ut., Sept. 22, '93

STANDARD COURSE.

FIVE MILES.

11.31 4-5	A. G. Relyea	Brooklyn, N. Y., Oct. 31, 1896
11.49	L. N. Walleston	Newburyport, Mass., Oct. 4, '95
12.55	Monte Scott	Plainfield, N. J., Oct. 12, 1894
13.48	F. A. McFarland	San Jose, Cal., Oct. 28, 1894
15.54	R. A. Schwaner	Winterset, Ia., Aug. 22, 1895

STRAIGHTAWAY.

TEN MILES.

21.25	A. B. McDonell	Buffalo, N. Y., May 26, 1896
24.16 1-5	W. A Parker	Waco, Tex., Nov. 29, 1894
24.27	F. M. Byrne	San Francisco, Cal., Oct. 19, '95
25.28	E. Kostomlatsky	Oskaloosa, Iowa, Oct. 27, 1895
28.19 1-2	Henry Smith	Baltimore, Md., May 23, 1897
29.26	J. S. Jensen	Salt Lake City, Ut., July 10, '94

STANDARD COURSE.

TEN MILES.

24.14	L. N. Walleston	Newburyport, Mass., Oct. 4, '95
24.20 1-5	C. M. Hendrickson	Brooklyn, N. Y., Nov. 7, 1896
26.04	Max M. Kreutz	Denver, Col., Aug. 15, 1896
26.07 2-5	Monte Scott	Plainfield, N. J., Oct. 12, 1894
26.34	H. C. Wood	Kansas City, Mo., Oct. 17, 1895
27.32	A. C. Mertens	St. Paul, Minn., May 30, 1895
28.17 2-5	J. T. Graves	Cleveland, O., Oct. 19, 1894
28.50 1-4	E. Boren	Dallas, Tex., Aug. 27, 1894
29.10	W. H. Whitehead	Memphis, Tenn., Aug. 14, 1894

STRAIGHTAWAY.

FIFTEEN MILES.

34.32	A. B. McDonell	Buffalo, N. Y., May 26, 1896
40.00	W. A. Borton	Oskaloosa, Ia., Oct. 27, 1895
42.48	W. S. Furman	Cincinnati, O., July 4, 1894
45.36 1-2	Henry Smith	Baltimore, Md., May 23, 1897
49.40	T. D. Fenton	Salt Lake City, Ut., May 30, '95

STANDARD COURSE.

FIFTEEN MILES.

Time.	Riders.	Track and Date.
36.24	L. N. Walleston	Newburyport, Mass., Oct. 4, 1895
36.57 2-5	C. M. Hendrickson	Brooklyn, N. Y., Nov. 7, 1896
39.30	Monte Scott	Plainfield, N. J., Oct. 12, 1894
42.29	A. LeJeal	Erie, Penn., Sept. 1, 1894
44.38 4-5	A. L. Proulx	Kansas City, Mo., June 18, '94

STRAIGHTAWAY.

TWENTY MILES.

46.01	A. B. McDonell	Buffalo, N. Y., May 26, 1896
50.08	W. A. Parker	Waco, Tex., Nov. 29, 1894
53.30	W. A. Borton	Oskaloosa, Ia., Oct. 27, 1895
1.09.30	Henry Smith	Baltimore, Md., May 9, 1897

STANDARD COURSE.

TWENTY MILES.

48.58	L. N. Walleston	Newburyport, Mass., Oct. 4, '95
52.51	Monte Scott	Plainfield, N. J., Oct. 12, 1894
52.51 4-5	Chas. A. Kraft	San Leandro, Cal., July 12, '96
58.16	C. T. Earl	Brooklyn, N. Y., Nov. 3, 1896
58.56	W. S. Furman	Lima, O., May 30, 1894
59.36	C. E. Gause	Washington, D. C., Oct. 16, 1894
1.02.12	D. L. Burnside	Cedar Rapids, Ia., June 19, '95
1.05.55	A. LeJeal	Sharon, Penn., Sept. 6, 1894

STRAIGHTAWAY.

TWENTY-FIVE MILES.

51.55	A. B. McDonell	Buffalo, N. Y., Oct. 19, 1895
1.02.38	E. Tyler Smith	Denver, Col., Sept. 7, 1896

STANDARD COURSE.

TWENTY-FIVE MILES.

1.00.59	L. N. Walleston	Newburyport, Mass., Oct. 4, '95
1.05.21 3-4	Monte Scott	Plainfield, N. J., Oct. 12, 1894
1.09.26	A. B. Goehler	Buffalo, N. Y., June 4, 1895
1.09.42 2-5	W. S. Furman	Cleveland, O., May 30, 1895
1.10.00	Ross Miller	St. Louis, Mo., July 14, 1895
1.10.30 2-5	C. S. Wells	San Leandro, Cal., Feb. 22, 1896
1.10.45	L. A. Callahan	Providence, R. I., July 7, 1894
1.21.33 1-2	Henry Smith	Baltimore, Md., May 23, 1895
1.26.00	S. T. Durant	Salt Lake City, Ut., Oct. 10, '95
1.28.00	M. W. McClure	Dallas, Tex., Sept. 28, 1895

STRAIGHTAWAY.

FIFTY MILES.

2 15.00	L. C. Wahl	Colorado Sp'ngs, Col., May 10, '95
3.11.00	C. F. Manahan	Ackley, Ia., Aug. 1, 1895
3 25.00	F. J. Whitson	Grand Island, Neb., Sept. 29, '95
3 55.00	J. Wilmans	Dallas, Tex., June 30, 1894

STANDARD COURSE.

FIFTY MILES.

Time.	Rider.	Track and Date.
2.30.31	A. W. W. Evans	New B'nswick, N.J., Aug.10,'96
2.30.40	A. E. Weinig	Buffalo, N. Y., Sept. 15, 1894
2.43.29 1-2	Henry Smith	Baltimore, Md., May 23, 1897
3.10.00	Ross E. Miller	St. Louis, Mo., July 14, 1895
3.15.00	N. W. Hewett	Salt Lake City, Ut., Oct. 6, '95
3.48.00	F. Taylor	Dallas, Tex., March 23, 1895

SEVENTY-FIVE MILES.

4.17.12 1-2	Henry Smith	Baltimore, Md., May 23, 1897

STRAIGHTAWAY.

ONE HUNDRED MILES.

4.40.00	A. B. McDonell	Buffalo, N. Y., Oct. 28, 1895

STANDARD COURSE.

ONE HUNDRED MILES.

5.22.30	P. Carlton Wright	Colorado Sp'ngs, Col., Aug.9,'96
5.33.30	F. C. Fuhrman	Buffalo, N. Y., Sept. 7, 1895
5.35.00	R. P. Searle	Elizabeth, N. J., Oct. 12, 1894
5.42.00	C. A. Wescott	Chicago, Ill., Oct. 20, 1895
5.57.08	Henry Smith	Baltimore, Md., May 9, 1897
6.25.00	A. A. Hansen	Minneapolis, Minn., Apr. 16,'95
6.51.02	B. G. Goble	Pittsburg, Pa., Sept. 29, 1894
7.00.00	R. E. Miller	St. Louis, Mo., July 14, 1895
7.18.00	C. F. Manahan	Ackley, Iowa, Aug. 4, 1895
7.20.00	C. G. Merrills	Cleveland, O., Oct. 8, 1893
7.32.00	E. J. Whitson	Grand Island, Neb., Sept. 29,'95
7.32.00	S. T. Durant	Salt Lake City, Ut., Oct. 10,'95
8.21.00	F. Taylor	Dallas, Tex., Mar. 23, 1895

TWO HUNDRED MILES.

12.20.00	A. W. W. Evans	N. Brunswick, N.J., Aug.19,'95
13.10.40	T. T. Mack	Buffalo, N. Y., Oct. 19, 1894
14.34.55	Henry Smith	Baltimore, Md., May 9, 1897
14.43.00	A. E. Smith	Chicago, Ill., Aug. 29, 1896
15.04.00	W. F. Taylor	Norwood, Mass., Aug. 8, 1897
15.57.00	C. G. Merrills	Cleveland, O., Oct. 8, 1893
16.18.00	Mrs. A. E. Rinehart	Denver, Col., Sept. 27, 1896
18.09.00	A. A. Hansen	Minneapolis, Minn., Apr.18,'95
20.15.00	C. E. Jenkins	Omaha, Iowa., Sept. 7-8, 1895

THREE HUNDRED MILES.

22.56.08	Henry Smith	Baltimore, Md., May 9-10, 1897

TWELVE HOURS.

170 miles	Henry Smith	Baltimore, Md., May 9, 1897
161 "	A. E. Smith	Chicago, Ill., Aug. 29, 1896

TWENTY-FOUR HOURS.

	Riders.	Track and Date.
316 miles,	Elmer C. Davis	Baltimore, Md., July 10-11, '97
295 miles, 264 feet	A. E. Smith	Chicago, Ill., Oct. 24-25, 1896
277 "	A. W. W. Evans	N. Brunsw'k, N. J., Aug. 19-20, '95
246 "	C. G. Merrills	Cleveland, O., Oct. 8-9, 1893

MISCELLANEOUS STATE TANDEM RECORDS NOT NOTED IN NATIONAL TABLES.

Colorado—5 miles, straightaway—11.36 3-5, Wright-Fairley, Colorado Springs, June 20, 1895.
Missouri—50 miles, standard—3.10.00, Wills-Cochran, St. Louis, July 14, '95.
Missouri—100 miles, standard—7.00.00, Wills-Cochran, St. Louis, July 14, '95.

THIRTY-DAY CENTURY RECORDS.

Pennsylvania—John H. George, Philadelphia, 29 centuries, Oct. 1-30, 1896.
Maryland—S. M. Warns, Baltimore, 28 centuries, Aug. 25-Sept. 23, 1896.
Colorado—Mrs. A. E. Rinehart, Denver, 25 centuries, Oct. 17-Nov. 15, 1896.
Wisconsin—W. D. Harper, Jr., Milwaukee, 12 centuries, July 1897.

SIXTY-DAY CENTURY RECORDS.

Pennsylvania—John H. George, Philadelphia, 70 centuries, Sept. 1-Oct. 30, '96.
Colorado—Mrs. A. E. Rinehart, Denver, 46 centuries, Sept. 27-Nov. 25, 1896.
Maryland—S. M. Warns, Baltimore, 45 centuries, July 30-Sept. 27, 1896.

THIRTY-DAY MILEAGE RECORDS.

Pennsylvania—John H. George, Philadelphia, 3,900 miles, Oct. 1-30, 1896.
Maryland—S. M. Warns, Baltimore, 3,581 miles, Aug. 25-Sept. 23, 1896.
Illinois—R. E. O'Connor, Chicago, 2,786 miles, July 1-30, 1896.
Colorado—Mrs. A. E. Rinehart, Denver, 2,628 miles, Oct. 17-Nov. 15, 1896.

SIXTY-DAY MILEAGE RECORDS.

Pennsylvania—John H. George, Philadelphia, 7,000 miles, Sept. 1-Oct. 30, '96.
Maryland—S. M. Warns, Baltimore, 5,837 miles, July 2-Aug. 30, 1896.
Illinois—R. E. O'Connor, Chicago, 5,364 miles, July 2-Aug. 30, 1896.
Colorado—Mrs. A. E. Rinehart, Denver, 4,962½ miles, Sept. 27-Nov. 25, '96.

YEAR'S CLUB CENTURY RECORDS.

Pennsylvania—Century Wheelmen, Philadelphia, 1,213 centuries, 1896.
Illinois—Lincoln Cycling Club, Chicago, 604 centuries, 1895.
Maryland—C. C. C. of Maryland, Baltimore, 462 centuries, 1896.

CLUB CENTURY SURVIVOR'S RECORD.

Century Wheelmen, Philadelphia, Pa., June 13, 1896, 194 survivors.

CENTURY COURSE RECORDS.

Elgin-Aurora Century Course—5.57.30, H. Kohl, Sept. 27, 1895.
Buffalo-Leroy Century Course—5.33.20, F. C. Fuhrman, Sept. 8, 1895.
Buffalo-Dunkirk Century Course—6.36.45, Edw. P. Zahm, June 26, 1897.
Denver-Evans Century Course—6.50.30, C. H. Anderson, June 20, 1897.
Minneapolis-Northfield Century Course—7.03.00, A. A. Hansen, Oct. 15, '94.

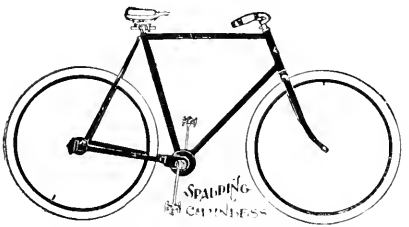
Colorado Springs-Pueblo Century Course—5.53.45, P. Carlton Wright, May 24, 1896.
Elgin-Aurora Century Course (tandem)—5.57.00, F. G. Clark and John D. Andrews, July 18, 1897.
Chicago-Libertyville-Waukegan Century Course—5.04.00, C. A. Wescott, Aug. 9, 1896.
Toledo-Clyde Century Course—7.00.00, C. O. Lasley, Oct. 11, 1896.
St. Louis-Bonhomme Century Course (tandem)—6.50.00, Geo. S. Easton and Ernest Wills, Oct. 8, 1896.
Cleveland-Geneva Century Course—6.58.00, Frank R. Blackmore, Oct. 10,'96.
Cleveland-Geneva Century Course (tandem)—6.58.00, Wm. Lockwood and Leroy Calkins, Oct. 10, 1896.
Chicago-Libertyville-Waukegan Century Course (tandem)—5.43.00, Frank G. Clark and John D. Andrews, Aug. 29, 1897.
Milwaukee-Watertown Century Course—7.19.00, Geo. Schmidt, Aug., 1897.

CITY TO CITY RECORDS.

New York-San Francisco—902.15.00, Norman De Vaux, John La France, June 1-July 8, 1896.
Chicago-San Francisco—660.00.00, Norman DeVaux, John La France, June 11-July 8, 1896.
New York-Philadelphia—7.06.00, John M. Nobre, Nov. 21, 1896.
New York-Philadelphia and return—18.17.00, A. Peitscher, Nov. 1, 1896.
New York-Albany—21.51.00, R. P. Searle, Oct. 22-23, 1894.
Chicago-New York—137.21.00, A. E. Smith, June 28-July 4, 1896.
Chicago-Buffalo—59.34.00, A. E. Smith, June 28-July 1, 1896.
Chicago-Rochester—68.22.00, A. E. Smith, June 28-July 1, 1896.
Chicago-Cleveland—35.30.00, A. E. Smith, June 28-30, 1896.
Chicago-Milwaukee—5.00.00, A. E. Smith, Oct. 1896.
Cleveland-New York—75.51.00, A. E. Smith, June 30-July 4, 1896.
Cleveland-Rochester—30.52.00, A. E. Smith, June 30-July 1, 1896.
Cleveland-Buffalo—15.00.00, A. E. Smith, July 10, 1896.
Boston-Chicago—348.00.00, A. C. Smith, A. L. Bianchi, Sept. 9-24, 1894.
Boston-Detroit—275.30.00, F. E. Develin, July 21-Aug. 1, 1894.
Buffalo-Erie—6.30.00, L. H. Bannister, Sept. 28, 1893.
Buffalo-Erie and return—13.10.40, T. T. Mack, Oct. 19, 1894.
Buffalo-Pittsburgh—21.15.30, C. G. Wallin, Aug. 24-1895.
Buffalo-Rochester—2.57.27, A. B. McDonell, Oct. 22, 1895.
Baltimore-Philadelphia—9.30.00, S. M. Warns, Dec. 1, 1895.
Baltimore-Washington—2.49.00, L. C. Wahl, Oct. 18, 1893.
Erie-Pittsburg—13.11.30, C. G. Wallin, Aug. 24-25, 1894.
Erie-Buffalo—1.40.09, A. B. McDonell, Oct. 28, 1895.
Frederick-Baltimore—3.23.00, S. M. Warns, June 21, 1896.
Rochester-New York—67.41.00, A. F. Smith, July 1-4, 1896.
St. Louis-DeSoto—3.05.00, A. G. Harding, Nov. 16, 1894.
St. Louis-DeSoto and return—7.47.40, H. Kohl, May 3, 1895.
Syracuse-Utica—2.59.00, A. J. Rosentreter, Aug. 9, 1895.
Syracuse-Utica and return—6.33.00, A. J. Rosentreter, Aug. 9, 1895.
Utica-New York—35.51.00, A. E. Smith, July 3-4, 1896.
Springfield-Boston and return—17.28.30, F. C. Graves, Oct. 31, 1893
Colorado Springs-Denver—1.07.00, T. O. Vaux, May 8, 1896.
Colorado Springs-Denver and return—12.55.00, R. E. Osborne, June 28, 1896
Hagerstown-Baltimore—5.11.30, F. H. Harvey, Oct. 15, 1893.
Louisville-Paris and return—18.32.00, N. G. Crawford, July 27, 1896.
Rockford-Chicago—6.50.00, R. P. Searle, July 19, 1894.
Rockford-Chicago and return—19.48.00, F. J. Ashton, July 31, 1893.
Lexington-Covington—6.50.10, C. E. Nadonil, May 5, 1894
Colorado Springs-Pueblo—2.07.00, L. C. Wahl, May 10, 1895.
Minneapolis-St. Cloud and return—2.58.00, A. A. Hansen, April 18, 1895.
Terre Haute-Brazil—43.00, E. C. Pierce, Oct. 27, 1895.

Rockville-Terra Haute—1.31.30, E. F. Colberg, June 20, 1897.
Rockville-Terra Haute (tandem)—1.19.30, Anton Hulman and and C. A Forster, June 20, 1897.
New York-Philadelphia (tandem)—8.50.00, R. H. Bartsch and Nonnenbacher, Aug. 25, 1895.
New York-Philadelphia and return (tandem)—19.56.00, R. H. Bartsch and J. Nonnenbacher, Aug. 25, 1895.
Denver-Brighton (tandem)—.53.00, H. G. Kennedy and J. A. McGuire, Dec. 9, 1894.
Denver-Plattville (tandem)—1.45.00, H. G. Kennedy and J. A. McGuire, Dec. 9, 1894.
Terra Haute-Rockville (tandem)—1.34.00, W. L. Krieteustein and E. P. Hamilton, Oct. 13, 1895.
Chicago-Milwaukee (tandem)—7.35.00, Otto V. Mueller and J. N. Halifax, Aug. 16, 1896.
San Francisco-Los Angeles—67.35.00, E. O. Kragness, June 22-24, 1897.
Oakland San Jose—2.05 40, E. O. Kragness, Sept. 12, 1897.
Portland-Boston and return - 21.35.00, F. R. Lang, Sept. 11-12, 1897.

The Spalding Chainless



Series No. 11

SPECIFICATIONS

Model No. 1122

Frame	Standard height, 22 inches; 3-inch drop at crank hanger. Front tubes, $1\frac{1}{8}$ inch; rear tubes, $\frac{7}{8}$ inch lower, $\frac{3}{4}$ inch upper, reinforced; wheel base, $44\frac{3}{8}$ inches.
Front Fork	Arch fork crown; side forks reinforced.
Bearings	Tool steel cut from bar; tempered, ground and polished.
Tires	Goodrich single tube, 28 inch $1\frac{5}{8}$ inch.
Spokes	Straight tangent, swaged; 28 front, 32 rear.
Cranks	$6\frac{3}{4}$ inch; round spring steel.
Pedals	Spalding combination.
Handle Bars	No. 7.
Saddle	Christy
Gear	72-inch.
Weight	As per specifications, without tires or saddle, 22 pounds.
Finish	Black Enamel.

OPTIONS.—24-inch frame, Model 1124. Gear, 66 or 81. Handle bars, Nos. 1, 3, 4, 5, 6, 8 or 9. Finish, Black Enamel, white striped; Spalding Blue Enamel, white striped with red band rims. Tires, Hartford, Palmer or Kangaroo.

For Prices, apply to nearest agent or write to factory.

THE SPALDING CHAINLESS has passed the experimental stage and we present it to the trade as an unqualified success, and the essence of perfection in this type of machine. It is handsome in design, and possesses many points of mechanical detail which simplify its construction, and will appeal strongly to the mechanical mind.

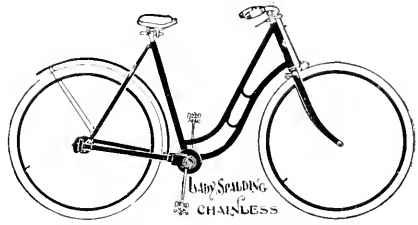
New York
Philadelphia

A. G. SPALDING & BROS.
Factory, Chicopee Falls, Mass.

Chicago
Washington

...THE...

Lady Spalding Chainless



Series No. 10

SPECIFICATIONS

Model No. 1022

Frame	Standard height, 22 inches; 3-inch drop at crank hanger. Front tubes, $1\frac{1}{8}$ inch lower, 1 inch upper; Rear tubes, $\frac{7}{8}$ inch lower, $\frac{3}{4}$ inch upper, reinforced; wheel base, $44\frac{3}{8}$ inches.
Front Fork	Arch fork crown; side forks reinforced.
Bearings	Tool steel cut from bar; tempered, ground and polished.
Tires	Goodrich single tube; 28 inch by $1\frac{5}{8}$ inch.
Spokes	Straight tangent, swaged; 28 front, 32 rear.
Cranks	$6\frac{1}{2}$ inch; round spring steel.
Pedals	Spalding rubber.
Handle Bars	No. 6.
Saddle	Christy.
Gear	$66\frac{1}{2}$ inch.
Weight	As per specifications, without tires or saddle, 23 pounds.
Finish	Black Enamel.

OPTIONS.—20-inch frame. Model, No. 1020. Gear, 72. Handle bars, Nos. 1, 2, 7 or 8. Tires, Hartford, Palmer or Kangaroo. Finish, Black Enamel, white striped. Spalding Blue Enamel, white striped.

For Prices, apply to nearest agent or write to factory.

THE LADY SPALDING CHAINLESS contains the same mechanical features found in the gentlemen's model. The lines of the frame have been carefully studied, and, while exceedingly graceful, afford ample room for free and easy action in riding, and convenience in mounting and dismounting.

New York
Philadelphia

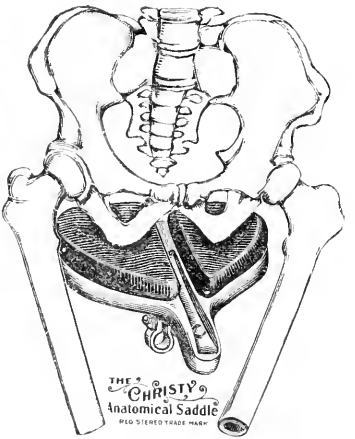
A. G. SPALDING & BROS.

Chicago
Washington

Factory, Chicopee Falls, Mass.

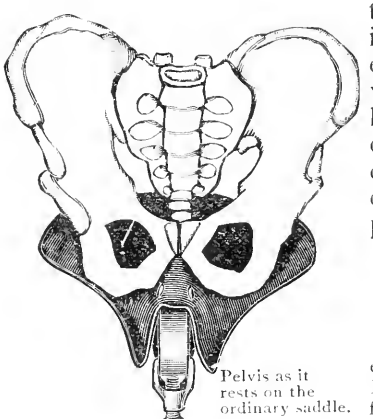
The Christy

Anatomical Saddle...



Pelvis as it rests on the Christy.

Has awakened the cycling public to the danger of cycling unless mounted on a properly constructed saddle. The Christy has the endorsement of thousands of physicians who use it themselves and prescribe it for their patients. Many of the leading bicycle manufacturers have adopted it as the exclusive equipment on their wheels. Insist upon having the Christy on your wheel. No dealer will lose a sale on account of your preference.



Pelvis as it rests on the ordinary saddle.

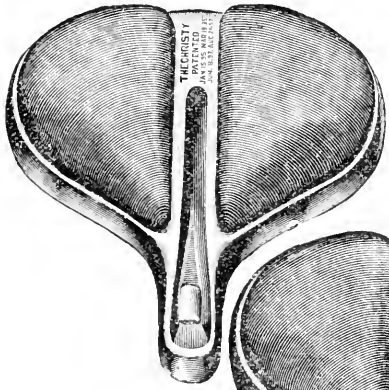
Send for booklet, "Bicycle Saddles, from a Physician's Standpoint," free.

A. G. SPALDING & BROS.

NEW YORK CHICAGO PHILADELPHIA WASHINGTON

The Christy Saddle

...FOR 1898...



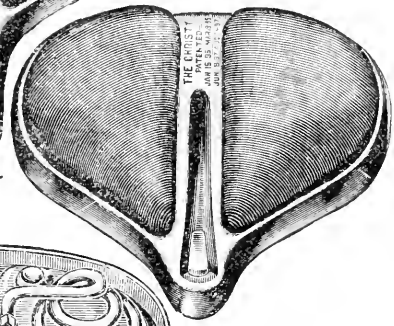
Men's Model.

MEN'S MODEL

No. 1. Medium size, width of seat, $8\frac{1}{4}$ in.

No. 3. Large size, width of seat, 9 in.

No. 4. Small size, width of seat, $7\frac{1}{2}$ in.

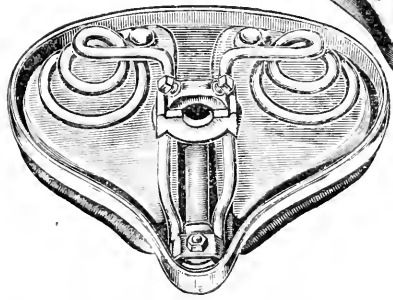


Women's Model.

WOMEN'S MODELS

No. 8. Small size, width of seat, $7\frac{1}{2}$ in.

No. 9. Large size, width of seat, 9 in.



Bottom View, showing Coil Springs.

A. G. SPALDING & BROS.

NEW YORK CHICAGO
PHILADELPHIA WASHINGTON

The Spalding Racer

Series No. 3

SPECIFICATIONS

Model No. 322

Frame	Standard height, 22 inches; tubular construction; flush joints; reinforced; front tubes, $1\frac{1}{8}$ inch; rear tubes, $\frac{7}{8}$ inch D lower, $\frac{3}{4}$ inch D upper; 3-inch drop at crank hanger; wheel base, $44\frac{3}{4}$ inches.
Front Fork	Arch fork crown; side forks reinforced.
Bearings	Tool steel cut from bar; tempered, ground, and polished.
Tires	Goodrich single tube, 28 inch by $1\frac{1}{2}$ inch.
Spokes	Straight tangent, swaged; 28 front, 32 rear.
Cranks	$6\frac{1}{2}$ inch, round spring steel.
Pedals	Spalding rat trap.
Handle Bars	No. 5.
Saddle	Brown Racing.
Gear	$74\frac{2}{3}$ inches—24 x 9.
Tread	5 inches.
Weight	As per specifications, without tires or saddle, 18 pounds.
Finish	Spalding Blue Enamel, white striped, red band rims.

OPTIONS.—20-inch frame, Model No. 320; 24-inch frame, Model No. 324. Handle bars, Nos. 1, 2, 3, 4, 8 or 9. Sprockets, 20, 22 or 26 front; 7, 8 or 10 rear. Cranks, $6\frac{3}{4}$ or 7 inches. Tires, Hartford, Palmer, or Kangaroo. Finish, Black Enamel, mahogany rims.

For Prices, apply to nearest agent or write to factory.

THE SPALDING RACER is in design and appearance an entirely new machine and largely so in construction, although embracing many of the mechanical features which have done so much to make the Spalding name pre-eminent wherever known. Every part of its mechanism has been improved wherever possible. It is without doubt the best chain bicycle we have ever produced, and in quality and excellence will leave nothing to be desired.

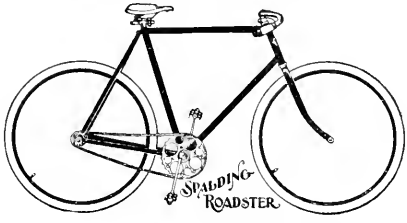
New York
Philadelphia

A. G. SPALDING & BROS.

Chicago
Washington

Factory, Chicopee Falls, Mass.

The Spalding Roadster



Series No. 9

SPECIFICATIONS

Model No. 922

Frame	Standard height, 22 inches; tubular construction; flush joints; reinforced, front tubes, 1⅛ inch; rear tubes, ⅞ inch D lower; ¾ inch D upper; 3-inch drop at crank hanger; wheel base, 44¾ inches.
Front Fork	Arch fork crown; side forks reinforced.
Bearings	Tool steel cut from bar; tempered, ground and polished.
Tires	Spalding single tube, 28 inch by 1⅝ inch.
Spokes	Straight tangent, swaged; 28 front, 32 rear.
Cranks	6¾ inch, round spring steel.
Pedals	Spalding combination.
Handle Bars	No. 2.
Saddle	Christy.
Gear	74⅔ inch—24 x 9.
Tread	5 inches.
Weight	As per specifications, without tires or saddle, 20 pounds.
Finish	Black Enamel, nickel trimmings.

OPTIONS.—24-inch frame, Model No. 924; 26-inch frame, Model No. 926. Handle bars, Nos. 1, 3, 4, 5, 8 or 9. Sprockets, 20 or 22 front; 8 to 10 rear. Brake.

For Prices, apply to nearest agent or write to factory.

THE SPALDING ROADSTER is specially constructed as our leader for the 1898 trade. In lines, and appearances generally, it will resemble THE SPALDING RACER, and all its parts and fittings receive the same care and attention as do the corresponding parts in other machines of our manufacture. This machine will compare favorably with any bicycle on the market, of any make, or at any price, and will prove a leader in every sense of the word.

New York
Philadelphia

A. G. SPALDING & BROS.

Chicago
Washington

Factory, Chicopee Falls, Mass.

The Lady Spalding

Series No. 8

SPECIFICATIONS

Model No. 822

Frame	Curved double tube; standard height, 22 inches; tubular construction; front tubes, $1\frac{1}{8}$ inch lower, 1 inch upper; rear tubes, $\frac{7}{8}$ inch D lower, $\frac{3}{4}$ inch D upper. All joints reinforced; 3-inch drop at crank hanger.
Front Fork	Arch fork crown; side forks reinforced.
Bearings	Tool steel cut from bar; tempered, ground and polished.
Tires	Spalding single tube; 28 inch by $1\frac{5}{8}$ inch.
Spokes	Straight tangent, swaged; 28 front, 32 rear.
Cranks	$6\frac{1}{2}$ inch, round spring steel.
Pedals	Spalding rubber.
Handle Bars	No. 1.
Brake	Direct plunger, with rubber friction blocks.
Saddle	Christy.
Gear	62 inch—20 x 9.
Weight	As per specifications, without tires or saddle, 22 pounds.
Finish	Black Enamel, mahogany rims and guards.

OPTIONS.—20-inch frame, Model No. 820; 24-inch frame, Model No. 824. Handle bars Nos. 2, 6 or 8. Sprockets, 22 front; 8 or 10 rear. Cranks, $6\frac{3}{4}$ inch.

For Prices, apply to nearest agent or write to factory.

THE LADY SPALDING is the counterpart of THE SPALDING ROADSTER in quality and workmanship. The lines of the frame have been improved in detail and appearance, and it represents the latest and best in everything that goes to make an ideal ladies' mount. It is "SPALDING QUALITY" throughout, which synonym stands for the best in everything it represents.

New York
Philadelphia

A. G. SPALDING & BROS.

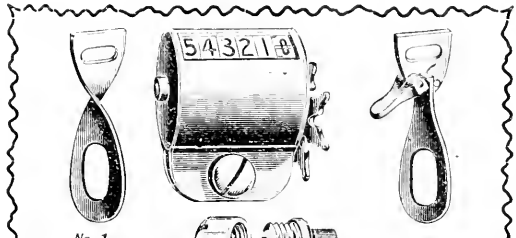
Chicago
Washington

Factory, Chicopee Falls, Mass.

Shepard's "Bevel Gear" Cyclometer

(PATENTED SEPT. 24, 1897.)

Is made like a fine watch in FINISH, DURABILITY AND ACCURACY. ONLY 11-16 OF AN INCH IN DIAMETER. Weight, 1¾ ounces, without the holder. Every part made from hardened brass and bronze, and nickel-plated, making it dust and rust proof. . . . . .



Exact size of Shepard Cyclometer.

Using this detachable holder the cyclometer can be detached and carried in the pocket. Riders who have had their cyclometers broken off in transit on railroads will appreciate this.

IT IS ABSOLUTELY SECURE, and the cyclometer can be easily taken off or put on without changing the adjustment in any way.

REQUIRES NO LUBRICANT The plate over the register is selected cut glass. The inside gear mechanism is a marvel of simplicity and accuracy—not a spring in the entire construction. A positive geared motion with every revolution of the bicycle wheel.

...EVERY ONE WARRANTED...

Records to 10,000 Miles, and Repeats.

The Cyclometer is made to go on left hand side of Bicycle—the mounting and dismounting side.

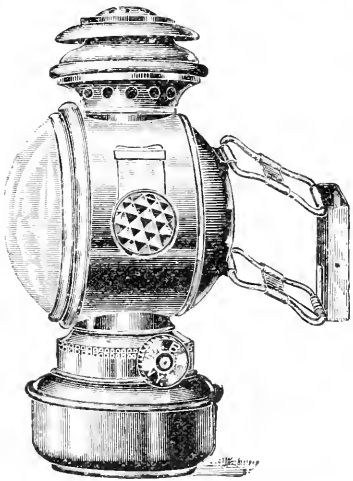
No. 1. **Shepard Cyclometer,** with Regular Holder, Each, **$1.00**

No. 2. **Shepard Cyclometer,** with Regular and Detachable Holder, ... **1.25**

Send for Complete Bicycle Sundries Catalogue.

New York
Philadelphia **A. G. SPALDING & BROS.** Chicago
Washington

SPALDING'S
BICYCLE SUNDRIES.

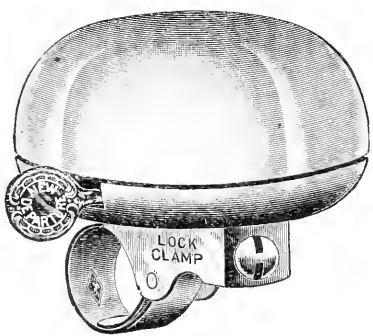


We carry a complete lin of Bicycle Sundries an shall be pleased to sen Catalogue on application.

Lamps
Bells
Enamel
Tire Cement
Rubber Cement
3 in 1 Compound
"RR" Compound
Illuminating Oil
Lubricating Oil
Repair Kits
Cyclometers
Bicycle Watches
Cork Grips
Oil Cans

Trouser Guards
Wrenches
Chains
Bundle Carriers
Pumps
Saddles
Bicycle Stands
Toe Clips
Tool Bags
Foot Brakes
Whistles
Screwdrivers

In fact, everything which is of use to bicyclists.



A. G. SPALDING & BROS. New York Chicago Philadelphia

SPALDING'S ATHLETIC GOODS

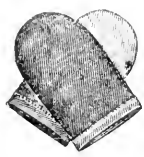
ATHLETIC BATH ROBES

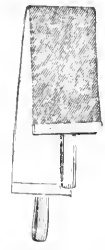
The following robes are of our own importation and specially adapted for athletic as well as bathing purposes. Our Eiderdown robe is extremely soft and comfortable and strongly recommended.

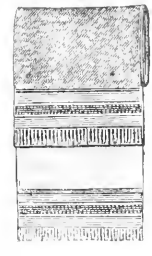
No. 1.	Robe, Fancy Toweling, .	$4.00
No. 6.	Eiderdown, extra quality, .	5.00

TOWELS, MITTS, ETC.

The newest thing in Bath Towels, etc., both soft and rough in one, one side being the rough Turkish surface, the reverse side soft and velvety. The advantage of this combination is at once apparent, and, to the bather, is a positive luxury, producing, with little effort, the friction and glow to the flesh so necessary and so exhilarating after the bath.



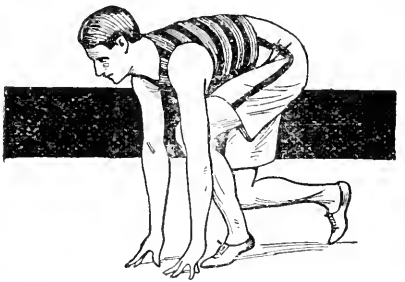




No. 0.	Turkish Bath Towel, extra large size, . . .		$1.25
No. 1.	Towels, combination, ...	Each,	.50
No. 2.	Mitts, ...	Per pair,	.40
No. 3.	Flesh Strap, ...	. .	.75
No. 4.	Bath Slippers, ...	Per pair,	1.00

Catalogue of All Sports Mailed Free.

A. G. SPALDING & BROS. New York Philadelphia Chicago Washington



SPALDING'S ...RUNNING SHOES

USED BY CHAMPIONS WEFERS, KILPATRICK, AND ALL THE LEADING RUNNERS

No. 2/0. "The Spalding" Shoe. Finest Kangaroo leather; an extremely light and glove-fitting shoe; best English steel spikes, firmly riveted on. Per pair, ... **$6.00**

No. 10. Finest Calfskin Running Shoe. Light weight, hand-made, six spikes. Per pair, . **$4.50**

No. 11. Calfskin Running Shoe. Machine-made, five spikes. Per pair, ... **$3.00**

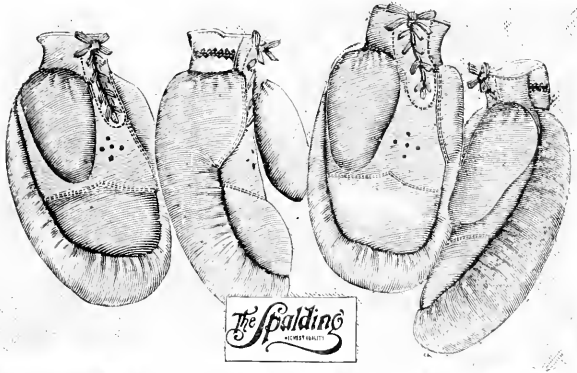
Catalogue of All Sports mailed Free.

A. G. SPALDING & BROS.

NEW YORK CHICAGO
PHILADELPHIA WASHINGTON

SPALDING'S

HIGHEST.... QUALITY BOXING GLOVES.



Representing the highest grade of material, workmanship and finish, and the most perfect in design our past experience enables us to produce.

No. **130.** Spalding's Highest Quality 8-oz. "Instructor's" Safety Glove, with GRAHAM'S Patent Finger Protector and BENNETT'S New Heel Pad, giving absolute protection to the sparrer under all conditions; made of the finest California tanned kid, laced front and stuffed with best curled hair. A very large and soft glove. . . . . Per set of four gloves, **$7.50**

No. **100.** Spalding's Highest Quality 6-oz. "Sparring" Glove, with GRAHAM'S Patent Safety Grip and Finger Protector; made of extra quality velvet tanned dogskin, stuffed with best curled hair and lace front. . . . Per set of four gloves, **$7.50**

No. **115.** Spalding's Highest Quality 5-oz. "Club" Glove, with GRAHAM'S Patent Safety Grip, extra quality velvet tanned dogskin, stuffed with best curled hair, lace front and heavily padded wrists; made in accordance with legal regulations governing public contests. . . . Per set of four gloves, **$7.50**

Our Complete Catalogue for all Athletic Sports and Uniforms Mailed Free to any Address.

A. G. SPALDING & BROS.,

New York. **Chicago.** **Philadelphia.**

Spalding's
Bicycling and Outing Sweaters.

Shaker Sweaters.

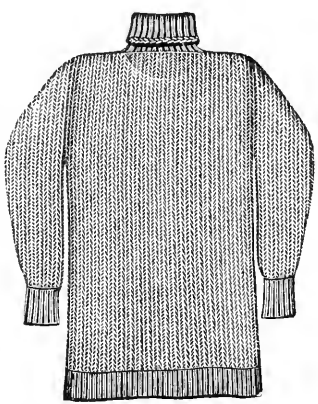
Our Shaker Sweaters are made of selected American wool and are superior in quality, fit and finish to any sweaters in the market at equal prices. We guarantee them to be absolutely all wool and full shaped to body and arms. Colors: White, Black, Navy Blue and Tan.

No. **3.** Standard weight, **$3.50**
No. **5.** Medium weight, **2.75**

Ribbed Sweaters.

Made of fine Australian wool, are heavy ribbed and handsomely woven, full shaped to body and arms, and guaranteed the finest and best line of Ribbed Sweaters ever offered at the price. White, Navy Blue, Black and Maroon.

No. **PX.** Special weight, **$3.00**
No. **7.** Standard weight, **3.00**
No. **9.** Medium weight, **2.00**



Fancy Mixtures.

All Wool Ribbed Sweater in fancy mixtures. A new and pleasing departure from the prevailing solid colors.

No. **15.** Standard weight, **$4.00**

Catalogue on Application. **A. G. Spalding & Bros.** NEW YORK CHICAGO, PHILA.

The Spalding
HIGHEST QUALITY

Athletic Sweaters

Our "Highest Quality" Sweaters are made of the very finest Australian lamb's wool and are exceedingly soft and pleasant to wear. They are full fashioned to body and arms and without seams of any kind. We call special attention to the "Intercollegiate" grade, which were originally made by special order for the Yale foot ball eleven and are now exclusively used by all Intercollegiate players. They are considerably heavier than the heaviest sweater ever knitted and cannot be furnished by any other maker, as we have exclusive control of this special weight. The various grades in our "Highest Quality" Sweaters are identical in quality and finish, the difference in price being due entirely to variations in weight. Colors: White, Navy Blue, Black and Maroon.

No. A.	"Intercollegiate,"	special weight,	$7.00
No. B.	Heavy weight,	.	5.00
No. C.	Standard weight,	.	4.50

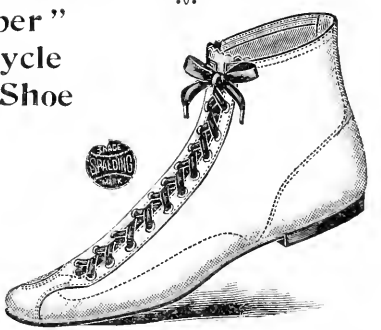
Complete Catalogue of Athletic Uniforms and all other requisites for Indoor and Outdoor Sports mailed free to any address.

A. G. SPALDING & BROS.

New York Chicago Philadelphia Washington

Spalding's Bicycle Shoes

"Clipper" Bicycle Shoe



HIGH CUT.

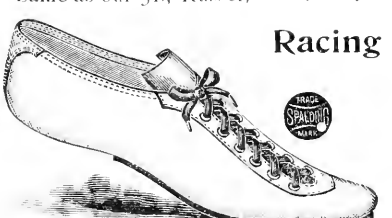
No. **4B.** Spalding's "Clipper" Bicycle Shoe, *High Cut*, selected calf, black, substantially made, and a very serviceable shoe, ... **$3.00**

No. **4T.** Same as our 4B, Russet, ... **3.00**

No. **3B.** Spalding's "Clipper" Bicycle Shoe, *Low Cut*, selected calf, black, substantially made, and a most excellent shoe for general wear, ... **$2.75**

No. **3T.** Same as our 3B, Russet, ... **2.75**

Racing Shoe



No. **2B.** Spalding's "Racing" Shoe, extremely light and glove-fitting; each pair furnished with cleats, which can be readily attached after the position of the tread has been determined. Worn almost exclusively by all professionals. **$3.50**

Catalogue of Bicycle Sundries free to any address.

A. G. SPALDING & BROS. New York Chicago Philadelphia

SPALDING'S INDIAN CLUBS.

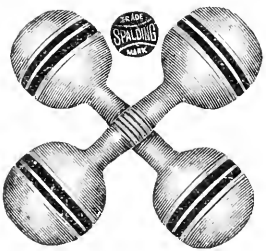
Our Trade Mark Indian Clubs are of selected material and perfect in shape. They are finely polished, with ebonite centre band and gilt stripe top and bottom. Each pair wrapped in paper bag.

TRADE MARK CLUBS.

WEIGHT.	PER PAIR.
1-2 pound,	$ .40
3-4 "	.45
1 "	.50
1 1-2 "	.60
2 "	.70
2 1-2 "	.75
3 "	.80
4 "	1.00
5 "	1.25

WOOD DUMB BELLS.

Our Trade Mark Bells are made of selected material, neatly decorated, well finished and of perfect balance.



WEIGHT.	PER PAIR.
1-4 pound,	$ .35
1-2 "	.35
3-4 "	.45
1 "	.50
1 1-2 "	.60
2 "	.65
3 "	.85
4 "	1.00

Our complete Catalogue for all Athletic Sports, Uniforms and Gymnasium Goods mailed free to any address.

A. G. SPALDING & BROS.,

NEW YORK. CHICAGO. PHILADELPHIA.

Spalding's Home Library

PUBLISHED MONTHLY

Devoted to Games and Pastimes of interest to the Home Circle.

1. Chess
2. Whist
3. Dominoes and Dice
4. Poker
5. Backgammon
6. Euchre
7. Billiards
8. Ecarte
9. Checkers
10. Bezique
11. Pool
12. Pinochle
13. Loto
14. Hearts
15. Reversi
16. Piquet
17. Go-Bang
18. Games of Patience
19. Children's Games
20. Cribbage
21. Drawing Room Games
22. Group of Card Games
23. Children's Games
24. Group of Card Games
25. Drawing Room Games

PRICE 10 CENTS

American Sports Publishing Co.
241 Broadway, New York

SPALDING'S
Athletic Library

No. **Published Monthly**

2. Indian Clubs and Dumb Bells.
4. How to Become a Boxer.
5. Gymnastics. [Campbell.
6. How to Play Lawn Tennis. By Champion.
7. How to Play Base Ball. Just the thing for Boys. By Walter Camp.
9. The Athlete's Guide. How to Run, Sprint, Jump, Walk, and Throw Weights.
12. Association Foot Ball.
13. Hand Ball.
14. Curling, Hockey and Polo.
16. Skating. A very practical book. By Champion.
18. Fencing. [Geo. D. Phillips.
20. Cricket Guide. By Geo. Wright.
21. Rowing. By E. J. Giannini, Champion Amateur.
23. Canoeing. By C. Bowyer Vaux. [Oarsman.
25. Swimming. By Walter G. Douglas.
26. How to Play Foot Ball. By Walter Camp.
27. College Athletics. By M. C. Murphy. [son.
29. Exercising with Pulley Weights. H. S. Ander-
30. How to Play Lacrosse. By W. H. Corbett.
32. Practical Ball Playing. By Arthur A. Irwin.
37. All Around Athletics
39. Lawn Bowls. By Henry Chadwick.
40. Archery. By James S. Mitchel.
42. How to Use the Punching Bag.
55. Sporting Rules; for discus throwing, etc.
57. Official Roller Polo Guide for 1896-7.
58. Bowling. Latest rules and regulations.
60. Indoor Base Ball.
61. Athletic Almanac for 1897.
62. Military Cycling in the Rocky Mountains. By Lieut. James A. Moss, U. S. A.
63. Spalding's Official Base Ball Guide.
64. Spalding's Lawn Tennis Annual.
65. Intercollegiate A. A. A. A. Guide.
66. Technical Terms of Base Ball.
67. Rowing Guide.
68. Official Croquet Guide.
69. Official A. A. U. Rules. [Walter Camp.
70. Official Foot Ball Guide for 1897. Edited by
71. Official Golf Guide.
72. Physical Training Simplified. No Apparatus.
73. Official Basket Ball Guide for 1897-8.
74. Official Bicycle Guide. Instructions to cyclists; Portraits of all leading riders; complete list of records.

Per Copy, 10 cents, postpaid.

American Sports Publishing Co.,

241 BROADWAY, NEW YORK.

Spalding's

ILLUSTRATED
CATALOGUE OF

FALL AND WINTER.... Sports

FOOT BALL, ICE SKATES, GOLF AND POLO ATHLETIC AND GYMNASIUM OUTFITS SWEATERS, HUNTING CLOTHING AND EQUIPMENTS, AND ALL ACCESSORIES FOR FALL AND WINTER WEAR.

Handsomely illustrated, and the recognized authority for standard and up-to-date goods. Mailed free to any address.

A. G. SPALDING & BROS.

NEW YORK CHICAGO
PHILADELPHIA WASHINGTON